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APPLICATION NUMBER: *60/510,756*
FILING DATE: *October 13, 2003*
RELATED PCT APPLICATION NUMBER: *PCT/US04/33475*

Certified by

Jon W Dudas

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PTO/SB/16 (5-03)
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1/302 U.S. PTO 60/510756 101303

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Daivd C. Mark Christian H.	Newkirk Graham Reinke	Lawrenceburg, IN Springboro, OH Bellbrook, OH

☐ *Additional inventors are being named on the____ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (280 characters max)

PATIENT EQUIPMENT SUPPORT SYSTEM

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☒ Specification *Number of Pages* 28
☒ Drawing(s) *Number of Sheets* 53
☐ Application Data Sheet. See 37 CFR 1.76
☐ CD(s), Number
☒ Other (specify) Certificate 1.10

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FILING FEE AMOUNT ($)

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.
☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE

TYPED or PRINTED NAME Christopher E. Haigh

TELEPHONE 317-231-7719

Date 10/13/03

REGISTRATION NO. *(if appropriate)* 46377

Docket Number: 7175-73237

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Effective 01/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) **$160.00**

Complete if Known	
Application Number	Unknown
Filing Date	October 13, 2003
First Named Inventor	David C. Newkirk et al.
Examiner Name	Unknown
Art Unit	Unknown
Attorney Docket No.	7175-73237

METHOD OF PAYMENT *(check all that apply)*

☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

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Deposit Account Number: 10-0435

Deposit Account Name: BARNES & THORNBURG

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	750	2001	375	Utility filing fee	
1002	330	2002	165	Design filing	
1003	520	2003	260	Plant filing fee	
1004	750	2004	375	Reissue filing	
1005	160	2005	80	Provisional filing fee	160.00

SUBTOTAL (1) ($) **$160.00**

2. EXTRA CLAIM FEES FOR UTILITY AND

	Extra Claims			Fee from below	Fee Paid
Total Claims		-20** =	0	X	= 0.00
Independent Claims		- 3** =	0	X	= 0.00
Multiple Dependent					=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	84	2201	42	Independent claims in excess of 3
1203	280	2203	140	Multiple dependent claim, if not paid
1204	84	2204	42	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) **$0.00**

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FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non - English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	410	2252	205	Extension for reply within second month	
1253	930	2253	465	Extension for reply within third month	
1254	1,450	2254	725	Extension for reply within fourth month	
1255	1,970	2255	985	Extension for reply within fifth month	
1401	320	2401	160	Notice of Appeal	
1402	320	2402	160	Filing a brief in support of an appeal	
1403	280	2403	140	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,300	2453	650	Petition to revive - unintentional	
1501	1,300	2501	650	Utility issue fee (or reissue)	
1502	470	2502	235	Design issue fee	
1503	630	2503	315	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR § 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Statement	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	750	2809	375	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	750	2810	375	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	750	2801	375	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid SUBTOTAL (3) ($)

SUBMITTED BY				Complete *(if applicable)*	
Name (Print/Type)	Christopher E. Haigh	Registration No. (Attorney/Agent)	46377	Telephone	317-231-7719
Signature	Christopher E. Haigh			Date	October 13, 2003

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BARNES & THORNBURG

11 South Meridian Street
Indianapolis, Indiana 46204
(317) 236-1313
(317) 231-7433 Fax

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group:	Unknown
Confirmation No.:	Unknown
Application No.:	Unknown
Invention:	PATIENT EQUIPMENT SUPPORT SYSTEM
Applicant:	David C. Newkirk et al.
Filed:	Herewith (October 13, 2003)
Attorney Docket:	7175-73237
Examiner:	Unknown

CERTIFICATE UNDER 37 C.F.R. § 1.10

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Respectfully submitted,

Signature

Holly R. Kelley
Typed or Printed Name

Indianapolis, Indiana
(317) 231-7719

PROVISIONAL PATENT APPLICATION

of

David C. Newkirk
(Lawrenceburg, IN)

Mark Graham
(Springboro, OH)

and

Christian H. Reinke
(Bellbrook, OH)

for

PATIENT EQUIPMENT SUPPORT SYSTEM

Client Reference N1-14830

Attorney Docket 7175-73237

PATIENT EQUIPMENT SUPPORT SYSTEM

BACKGROUND OF THE INVENTION

The present disclosure relates to a system for supporting equipment and particularly to a system for supporting patient care equipment adjacent a patient-support device.

Hospitalized patients often require patient care equipment to be in close proximity during care. Such patient care equipment may include heart monitoring equipment, medical gas delivery equipment, infusion pumps, intra-venous bags, equipment monitors, defibrillators, and other patient care equipment, many of which directly connect to the patient via lines or tubes.

SUMMARY OF THE INVENTION

The present invention relates to one or more of the following features or combinations thereof. A support structure is provided typically to be at the head end of a patient support device. The support structure may be configured to be mounted to extend between a hospital floor and ceiling, or upwardly from a hospital floor or downwardly from a hospital ceiling, or it may be configured to extend outwardly from a hospital wall or be embedded in the wall. The support structure may be positioned adjacent a hospital wall. An arm extends from the support structure and is pivotally movable relative to the structure, typically in a horizontal plane. The arm may be telescoping or fixed in length and comprise a first portion having a mount end pivotably mounted to the support structure and a distal end extending away from the support structure. The first portion is pivotable about a pivot axis, and a second portion is coupled to the distal end of the first portion and may be configured to telescope relative to the first portion.

A patient care column can be supported by the second portion, the patient care column providing either mounting capabilities for patient care equipment or a service head for patient care equipment, or both. Patient care equipment may be mounted or coupled to an equipment support, and/or patient care equipment may be coupled to any one or more of the services provided by one or more service heads.

The patient care column can be pivotable about a vertical axis passing through the distal end of the arm.

The support structure may be integrated with or part of a headwall and/or a bed locator. The support structure and/or arm and/or service head and/or headwall may have service outlets, such as for delivery of medical gases or suction, delivery of electrical power, and transmission of data.

Additional telescoping or fixed-length arms may be provided, and may be mounted to the support structure for horizontal pivotable movement about the same pivot axis, or about different axes. Such additional arms may carry a service head, a monitor, and/or patient monitoring equipment.

In some illustrative embodiments, a console or head wall unit is provided, the console providing cabinets for housing any one of the service head, the monitor, and the equipment support when these are in respective storage positions. A brake system is also provided, the brake system impeding the pivoting movement of at least one of the arms when the brake system is actuated.

Additional features will become apparent to those skilled in the art upon consideration of the following detailed description of illustrative embodiments exemplifying the best mode of carrying out various systems for transporting and supporting patient care equipment as presently perceived.

BRIEF DESCRIPTION OF THE DRAWINGS

The detailed description particularly refers to the accompanying figures, in which:

Fig. 1 is a perspective view of a patient care equipment support system having a patient support device positioned adjacent thereto;

Fig. 2 is a perspective view of the support system of Fig. 1, showing cabinets on both sides of the support system opened to expose a set of patient care columns configured for coupling with patient care equipment;

Fig. 3 is a perspective view showing the patient support device positioned at an angle relative to the support system and showing a telescoping arm and two fixed-length arms pivoted out to suspend the equipment supports at positions near the patient support device;

Fig. 4 is another perspective view of the patient support device and arms of the support system pivoted outwardly, illustrating a display-carrying arm positioned to engage a recess formed in the other fixed-length arm;

Fig. 5 is a perspective view, similar to Fig. 4, showing one arm segment of the telescoping arm in a retracted position relative to another arm segment of the telescoping arm;

Fig. 6 is a perspective view showing the support structure used to support the telescoping and pivoting arms;

Fig. 7 is a perspective view showing the support structure mounted adjacent to a hospital wall, the support structure extending between the hospital floor and ceiling and supporting the telescoping arm and two fixed-length pivoting arms therefrom;

Fig. 8 is a perspective view showing an alternative embodiment having a single column without cabinetry to house the equipment supports that support the patient care equipment thereon;

Fig. 9 is a cross-sectional view of the telescoping arm;

Fig. 10 is a perspective view of the telescoping arm with one of the outer housing pieces of the outer arm segment removed and the inner housing pieces of the inner arm segment shown in phantom;

Fig. 11 is a perspective view showing a brake system for the pivot arms;

Fig. 12 is an enlarged perspective view of the brake system for the pivot arm;

Fig. 13 is a perspective view of a transportable equipment management device positioned alongside a patient support device;

Fig. 14 is a perspective view of the support structure showing a pocket door being used to cover the cabinet;

Fig. 15 shows a perspective view of a movable supply cart that can be stored in the support structure cabinet;

Fig. 16 shows a perspective view of a stool that can also be stored in the cabinet;

Fig. 17 shows a perspective support system having a plurality of arms extending toward a plurality of patient support devices;

Fig. 18 is a perspective view of another embodiment, wherein arms extend from a plurality of walls toward a patient support device;

Fig. 19 is a perspective view of an equipment support arm;

Fig. 20 is a perspective view of an alternative embodiment of the equipment support arm and a service head;

Fig. 21 is a perspective view of another embodiment of a service head carrying patient support equipment and a patient monitor on a service head;

Fig. 22 is a perspective view of the head wall of the support system console, showing a CPU positioned in a cabinet having doors;

Fig. 23 is a perspective view of an equipment support arm showing the CPU positioned thereon;

Fig. 24 is a perspective view of an equipment support arm having a patient monitor positioned thereon, the patient monitor being potentially used by the patient for education or entertainment purposes;

Fig. 25 is another embodiment of a service head showing equipment support arms positioned thereon;

Fig. 26 is a perspective view of yet another service head;

Fig. 27 is a perspective view of still another embodiment of a service head;

Fig 28 is a perspective view of one embodiment of an equipment support arm;

Fig. 29 shows a perspective view of the equipment support arm after it has deposited the equipment support inside the cabinet;

Fig. 30 shows a perspective view of the equipment support arm pivoted to a position over the patient;

Fig. 31 shows a perspective view of a patient transfer device attached to the equipment support arm, the patient transfer device assisting with moving the patient to another location;

Fig. 32 is a perspective view of another embodiment of an equipment support;

Fig. 33 is a perspective view of a telescoping arm and a fixed length arm mounted to the support system frame;

Fig. 34 is a perspective view of the top of the support system frame, showing infrastructure used to support the frame in the ceiling;

Fig. 35 is another embodiment of the support system column, showing a light positioned above the console;

Fig. 36 is a perspective view of the top of the console head wall, showing a light mounted thereon;

Fig. 37 is a perspective view of an examination light that can be incorporated with the system;

Fig. 38 is a perspective view of another embodiment of the support system showing a service head column and an equipment support column;

Fig. 39 is a perspective view of another embodiment of the support system showing service ports provided in the head wall of the counsel, and two telescoping arms;

Fig. 40 shows a perspective view of a three-armed support system without a cabinet;

Fig. 41 shows a perspective view of a three-armed support system having a head wall;

Fig. 42 shows a perspective view of a three-armed support system having a head wall and one cabinet alongside;

Fig. 43 shows a perspective view of a three-armed support system having a head wall and two cabinets positioned alongside;

Fig. 45 is a perspective view of the head end of a patient support device;

Fig. 46 is a top perspective view of an alternative brake system;

Fig. 47 is a top perspective view of the brake system of Fig. 46 in the brake-engaged position;

Fig. 48 is a top perspective view of the brake system of Figs. 46-47 in the brake-released position;

Fig. 49 is a top perspective view of another alternative brake system utilizing an interlocking tooth on a caliper arm;

Fig. 50 is a top view of the brake system of Fig. 49 in the brake-engaged position; and

Fig. 51 is a top view of the brake system of Figs. 49-50 in the brake-released position.

DETAILED DESCRIPTION OF THE DRAWINGS

A patient care equipment support system 10 is shown in Fig. 1 with a patient support device 12 positioned in front of the system. Patient support device 12 is illustratively a hospital bed positioned in a hospital room, however, it should be understood that the present invention may be applied to other patient support devices, and in various types of settings including intensive care rooms, operating rooms, and physician offices.

In the embodiment illustrated in Fig. 1, support system 10 comprises a console including a head wall 14 having cabinets 16, 18 positioned on opposite sides thereof. Cabinets 16, 18 illustratively have bifold access doors 20, 22, however, it is within the scope of the invention to utilize other types of doors such as pocket doors 290, shown in Fig. 14, or even to leave cabinets 16, 18 without doors. It is within the scope of the disclosure to offer only one cabinet 16 or 18, as shown in Fig. 42, or to offer no cabinets, as can be seen in Figs. 8, 40, and 41. An upper space 59 defined by walls 65, 67 may or may not be offered. Fig. 43 shows an embodiment of a support system with a console that does not have an upper space 59 defined by walls 65, 67.

Drawers 24 are illustratively positioned under cabinets 16, 18 for providing additional storage. However, it is within the scope of the disclosure to replace at least one of drawers 24 with a movable storage cabinet or supply cart 210, such as a cart having a pivoting table 212 attached thereto as shown in Fig. 15. It is also within the scope of the disclosure to provide a pull-out stool 214 for use by a caregiver in the place of drawers 24, as can be seen in Fig. 16. Stool 214 is illustratively movable between a raised use position and a lowered storage position.

In the illustrative embodiment shown in Fig. 1, head wall 14 is shaped in a concave fashion such that the central portion of head wall 14 is recessed relative to the edges which contact cabinets 16, 18. Such a configuration permits the head end of patient support device 12 to be positioned closer to wall 26 and provides more clearance at the foot end of patient support device 12. A bed locator (not shown) can

be mounted to head wall 14 for assisting in positioning and retaining the bed in a fixed position. It is within the scope of the disclosure to provide headboards, head walls with other configurations, or to omit the head wall, as can be seen in Fig. 40.

Support system 10 is shown in Fig. 1 to be substantially flush with wall 26 such that cabinets 16, 18 and other portions of support system 10 are built into wall 26. However, it is should be understood that support system 10 could be positioned to extend outwardly from wall 26, or even be positioned away from wall 26 as an independent structure. In the embodiment illustrated in Fig. 17, a support system 216 is configured to support arms extending from more than one side of the support system. Such a configuration could allow for a plurality of patient support devices 12 to be positioned near support system 216, support system 216 providing patient care equipment support for the plurality of patient support devices 12 simultaneously.

As can be seen in Fig. 2, bifold access doors 20, 22 can be opened to expose the inside of cabinets 16, 18, respectively. A first arm 28 illustratively telescopes horizontally and has a patient care column coupled thereto. The patient care column illustratively comprises a first column 27, a second column 29 movable relative to the first column 27, and a post receiver 31 coupled to the second column 29. Post receiver 31 is configured to receive an equipment support 30 having a mount post 70. Illustratively, second column 29 telescopes vertically relative to first column 27 under the power of an electric motor, such as one found in a linear actuator, housed in first column 27, the electric motor being actuated by either a toggle switch (not shown) positioned on first column 27, or a wired or wireless remote control. Such vertical telescoping movement permits the equipment support 30 to be raised and lowered for optimal placement by a caregiver and for loading of equipment or IV bags by a caregiver. Additionally, such vertical telescoping movement can permit the docking of equipment support 30 on a post receiver mounted on a patient support device, such as can be seen in Fig. 13. Other locations for a post receiver are within the scope of the disclosure. For example, a post receiver may be located in a cabinet 16 or 18, thereby permitting the docking of equipment support 30 in a cabinet as can be seen in Figs. 28-30. In the alternative, a post receiver may be formed in a stand positioned near patient support device 12. Illustratively, second column 29 may move as much as 12 - 18 inches relative to first column 27. It should be understood that

drivers such as hydraulic cylinders, magnetic cylinders, pneumatic cylinders, and the like may be used to move column 29 relative to column 27 in lieu of an electric motor.

In another embodiment, as can be seen in Figs. 28-31, equipment support 218 is coupled to an upper support member 220, which is supported by first arm 28. Upper support member 220 moves vertically relative to the first arm 28 such that equipment support 218 can be moved between raised and lowered positions. Equipment support 218 illustratively includes a mount post 70, which can be mated with a post receive mounted inside a cabinet 16 or 18, or on a wall or stand. Illustratively, post receiver 222 is mounted inside cabinet 18 and equipment support 218 can be supported on post receiver 222 via mount post 70.

In the embodiment shown in Figs. 30-31, upper support member 220 is further configured to support a patient transfer device 224. Patient transfer device 224 illustratively resembles a body sling, but other patient transfer devices are within the scope of the disclosure. For example, an assist handle, a mattress support, or other variations of devices designed to lift, transfer and/or move patients are contemplated.

Illustratively, upper support member 220 may move vertically as much as 12 - 18 inches relative to first arm 28. Such vertical movement may be achieved by an electric motor, hydraulic cylinder, magnetic cylinder, pneumatic cylinder, or the like.

Equipment support 30 is configured to support patient care equipment thereon, as can be seen in Fig. 3. Equipment support 30 illustratively includes a secondary service head that can provide requisite electricity and services to an infusion management system 32, as pictured in Fig. 3. Illustratively, equipment support 30 is configured to hold IV bags on an upper portion 36 of support fame 30, and infusion management systems 32 can be mounted on a lower portion of equipment support 30. Equipment supports 30, 218 can be configured as shown in Fig. 32 to have service ports on a side 226 of equipment support 30, 218.

While patient support columns are illustrated and described herein as either equipment supports, service heads, structures for carrying equipment supports, structures for carrying patients, or a combination thereof, it should be understood that patient support columns may comprise any other device or element that could be

connected to an arm in a hospital room, operating room, or doctor's office. As used herein, the word "column" generally refers to a vertically disposed structure mounted on an arm, and the word "arm" generally refers to a horizontally disposed structure. However, these definitions should not be construed as limiting to the possibility of embodiments.

A second arm 34 is illustratively provided in Figs. 2-3, and is illustratively fixed in length and carries main service head 38. Main service head 38 may provide medical air, oxygen, medical vacuum, electronic data connectivity, and electricity, among other services that may be needed specific to the use of support system 10. Illustratively, such services have been positioned at sufficiently raised locations so as to allow a caregiver to access the service ports, while the dragging of medical lines and tubes is prevented. Alternative constructions for main service head 38 are within the scope of the disclosure, some of which are illustrated in Figs. 20-21, 25-27, and 40-41.

In some illustrative embodiments, such as those shown in Figs. 20-21, 23, and 25-27, main service head 38 may support other hardware, including patient monitor 44, satellite modules 46, an examination or other light, handles 232, 234, 236, or other items. Support for such hardware may be provided by rails 238, shown in Figs. 25-27. A vertical mounting rod 240 may be mounted on a service head or other column, as can be seen in Figs. 21 and 40-42. As shown in Fig. 20, monitor 44 may be mounted on another column and satellite modules mounted on service head 38.

As can be seen in Fig. 3, second arm 34 may be pivoted coaxially about the same pivot axis 40 as that which first arm 28 pivots about. However, it is within the scope of the disclosure to utilize separate pivot axes. For example, first and second arms 28, 34 may be spaced apart on a wall such that first and second arms 28, 34 have parallel pivot axes, or first and second arms 28, 34 may be positioned on separate walls, as can be seen in Fig. 18.

In the embodiment shown in Fig. 18, first arm 28 pivots about an axis 292 proximal to wall 296 and second arm 34 pivots about an axis 294 proximal to wall 298. Axes 292, 294 are illustratively parallel. First arm 28 is shown supported by an upper platform 300 and lower platform 302, while second arm 34 is shown

supported by a single upper platform 304. A supply cart 210 is illustratively provided in the room.

The illustrative infusion management systems 32 are manufactured by Alaris and are sold under the name Medley Medication Safety System. However, it should be understood that the disclosed equipment support 30 is configured for use with the products of any number of infusion management system manufacturers. It is also within the scope of the disclosure to mount infusion management systems 32 to main service head 38, or on any other column or arm provided by support system 10. It is further within the scope of the disclosure to mount monitor 44 on main service head 38, as can be seen in Fig. 21, or on any other column or arm provided by support system 10.

A third arm 42 is provided in the illustrative system 10, shown in Figs. 2-5. Third arm 42 is illustratively fixed in length and carries a patient monitor 44, a CPU, and/or satellite modules 46. Such satellite modules 46 may incorporate various monitoring devices for monitoring a patient's condition. Patient monitor 44 is illustratively connected to satellite modules 46 and displays information relating to the patient's condition. Satellite modules 46 are illustratively manufactured by Hewlett-Packard and marketed under the name Veridia System, but other modules or devices for monitoring a patient's condition can conceivably be carried by third arm 42.

As shown in Fig. 20, third arm 42 may carry patient monitor 44, while another column, illustratively service head 38, may carry satellite modules 46. Third arm 42 may have a service head portion 228, as can be seen in Figs. 19, 20, 24 and 38. Such a service head portion illustratively provides electricity and data ports, but other services may be provided and are within the scope of the disclosure.

Service ports 277 may also be provided in head wall 14, as can be seen in Fig. 39. In such an embodiment, selected services may still be provided on a column, such as can be seen on column 278. Illustratively, two telescoping arms 280, 282 may be provided.

Patient monitor 44 may be embodied to be used by the patient in addition to a caregiver, or patient monitor 44 may be configured for use by only the patient. In such embodiments, as shown in Fig. 24, the patient can view television

programming, educational programming, or other information offered by the hospital or physician's office.

A CPU 230 may be carried by third arm 42, as can be seen in Fig. 23. However, CPU 230 may be carried by any other arm or may be mounted inside the console or any other location conveniently accessed. CPU 230 is illustratively mounted inside a space 244 in head wall 14 that is enclosed by doors 242 in Fig. 22.

Illustratively, third arm 42 is constructed of two tubular beams 48 which extend outwardly in spaced apart relation, the two tubular beams 48 angling downwardly in a distal region thereof to join together at their distal ends, forming a central support for equipment support 56. Third arm 42 illustratively pivots about pivot axis 40 in a fashion similar to that of first arm 28 and second arm 34, although it is within the scope of the disclosure to have third arm 42 pivot about a separate axis.

In the embodiment illustrated in Fig. 5, each of first arm 28, second arm 34, and third arm 42 can carry some type of patient care column or patient support device at a distal end thereof. Furthermore, each column is pivotable about a second distal axis that is parallel to pivot axis 40. For example, equipment support 30 is pivotable about pivot axis 50 relative to first arm 28. Similarly, main service head 38 is pivotable about pivot axis 52 relative to second arm 34, and patient monitor 44 and satellite modules 46 are positioned on an equipment support 56 that is pivotable about pivot axis 54 relative to third arm 42. Such dual pivoting movement permits each of the arms to be accessible from a wide range of locations. Each arm may further be telescoping, which provides even greater flexibility and movement of the arms and attached columns.

First arm 28 is illustratively telescoping and comprises a first portion 58 that has a mount end 60 mounted for pivotable movement about pivot axis 40 and a distal end 62 extended away from mount end 60 as shown in Fig. 3. First arm 28 further comprises a second portion 64 that is coupled to the distal end of the first portion and configured to telescope relative to first portion 58. As can be seen in Fig. 3, such telescoping movement allows equipment support 30 to extend beyond the radial lengths of second and third arms 34, 42. Such telescoping movement permits telescoping arm 28 and service head 38 to pass around both second and third arms 34, 42 and the associated equipment suspended therefrom, providing the option of

positioning first arm 28 on either side of arms 34, 42, thereby giving a caregiver additional flexibility in setting up patient care equipment about a patient. Additionally, such telescoping movement allows the service head 38 or any other column mounted thereto to be positioned in a greater range of locations relative to the patient support device 12.

Second and third arms 34, 42 can also pass by each other to switch places. Such movement can be accomplished by either making one arm telescoping, similar to that disclosed above for first arm 28, or by pivoting main service head 38 and equipment support 56 about their respective axes 52, 54 so that they can pass each other without interference. Illustratively, the telescoping arm(s) or longer reaching arms are positioned vertically above the shorter arms, facilitating movement of the arms past each other.

In another embodiment, shown in Fig. 38, second and third arms 34, 42 are provided, and a telescoping first arm 28 is omitted. Illustratively, second and third arms 34, 42 are fixed in length, but can pass each other in the manner described above. Further illustratively, the embodiment shown in Fig. 38 has a bi-fold access door 20 cabinet 16 and no door on cabinet 18. A supply cart 210 is also provided.

As can be seen in Figs. 2-5, an upper space 59 can be provided that illustratively extends horizontally for substantially the length of the console. Upper space 59 is illustratively of sufficient depth to allow arms 28, 34, 42 to be positioned in their storage positions inside upper space 59. Upper space 59 is bounded on the upper side by wall 61 (which houses upper platform 82), and on the lower side by wall 63 (which houses lower platform 84). Upper space 59 is also bounded by side wall 65, extending vertically along one side of the console to simultaneously form a side wall for cabinet 16, and side wall 67, extending vertically along the other side of the console to form a side wall for cabinet 18.

Cabinets 16, 18 illustratively communicate with upper space 59 so that when arms 28, 34, 42 are in their storage positions, as shown in Fig. 2, columns 30, 38, 56 depend from the arms into storage cabinets 16, 18. Illustratively, the console is configured such that arms 28, 34, 42 and columns 30, 38, 56 can be stored completely within the console, without elements protruding from the console.

It should be understood that various embodiments and configurations for the console are within the scope of the disclosure, as can be seen in Figs. 40-43. Such a console may be sold to include only one cabinet 16 or 18, as illustrated in Fig. 42. The console may be sold without an upper space 59 bounded by walls, as illustrated in Figs. 42-43, or it may be sold with only a head wall 14, as can be seen in Fig. 41.

Lighting, whether ambient or for reading or examination purposes, may illustratively be mounted on the console, on an arm, and/or on a column. A movable examination light 284, as can be seen in Fig. 37, may be mounted on the ceiling or console, or on an arm or column. A console light 286 may be mounted above the head wall 14, as can be seen in Figs. 22 and 36, or built in to lower pier 122, as can be seen in Fig. 17. Ambient lights 288 may be mounted above the console to provide ambient lighting for the room, as can be seen in Fig. 35.

Equipment support 30 may illustratively comprise a mount post 70 (visible in Figs. 2-5 and 28) configured for insertion in a post receiver 246 coupled to frame 248 of patient support device 12, as can be seen in Fig. 45. Such a configuration facilitates the transfer of infusion management systems 32 or other patient care devices between a wall-mounted position as shown in Figs. 2-5 and 28 and a patient-support-device-mounted position.

The illustrative post receiver 246 of Fig. 45 is mounted on a post receiver frame 250 that is movable relative to patient support device 12. Illustratively, pull-knob 252 can be pulled to release a plunger (not shown) from one of the ends of track 256. Each end 257 of track 256 widens and has a notch that catches the plunger when it is moved to that end 257. In one embodiment, apertures or detents 254 can be formed in track 256, thereby permitting sliding movement of frame 250 relative to track 256. Detents 254 can be formed at any desirable point along track 256, and are illustratively spaced at equal increments along track 256. Track 256 illustratively extends substantially the width of patient support device 12. Although the illustrative embodiment utilizes a pull-knob and notch / aperture / detent locking system, variations for position-locking systems are within the scope of the disclosure.

It should be understood that third arm 42 and equipment support 56 (illustratively carrying patient monitor 44 and satellite modules 46) can be moved adjacent to either main service head 38 or equipment support 30. A recess 66 is illustratively formed in the upper portion of equipment support 30, such recess 66 being configured to receive equipment support 66 when third arm 42 is aligned parallel to first arm 28. Similarly, recess 68 is illustratively formed in an upper portion of main service head 38 for receiving equipment support 56 when third arm 42 is aligned parallel with second arm 34, as can be seen in Figs. 2, 4, and 5.

As can be seen in Figs. 6 and 7, the illustrative support system 10 includes a support structure frame 72 that is configured to extend between a hospital floor and a ceiling, illustratively a ceiling truss or ceiling support system. Such a ceiling truss or ceiling support system may need to be reinforced with support bars 276, illustratively comprised of tubular metal, as can be seen in Fig. 34. The support structure frame 72 illustratively comprises a first vertically extending member 74 and a second vertically extending member 76. A horizontal stabilizer 78 is mounted to the bottom of both vertically extending members 74, 76. An arm mount portion 80 extends laterally and between vertically extending members 74, 76. The arm mount portion comprises an upper platform 82 and a lower platform 84. Upper and lower platforms 82, 84 each have a hole 86 defined therein. A shaft or collar structure for arms 28, 34, 42 is mounted between the holes such that arms 28, 34, 42 can each individually pivot about pivot axis 40. As can be seen in Fig. 7, service lines 88 are illustratively dropped from the ceiling and selectively routed through arms 28, 34, 42 to provide medical air, oxygen, vacuum, telephone/data connectivity, and/or electricity, among other services that may be needed specific to the use of support system 10. Illustratively, many of service lines 88 are routed through second arm 34 to service head 38 to provide medical air, oxygen, vacuum, and/or electricity, however, some service lines may be routed through first arm 28 to provide any of the above services, as well as through third arm 42 for similar purposes, as dictated by the particular application of support system 10.

As can be seen in Figs. 6-7, lower platform 84 comprises a back wall 71 coupled to a front side of vertically extending members 74, 76 to define a vertical plane. Horizontal surface 73 cantilevers outwardly from back wall 71 and is

supported by side supports 75, 77 that extend downwardly and also couple to vertically extending members 74, 76. A lip 79 extends downwardly from a front edge of horizontal surface 73, lip 79 being further coupled to front edges of side supports 75, 77.

Similarly, upper platform 82 comprises a back wall 81 coupled to a front side of vertically extending members 74, 76 to define a vertical plane. Horizontal surface 83 cantilevers outwardly from back wall 81 and is supported by side supports 85, 87 that extend upwardly and also couple to vertically extending members 74, 76. A lip 89 extends upwardly from a front edge of horizontal surface 83, lip 89 being further coupled to front edges of side supports 85, 87.

Illustratively, vertically extending members 74, 76 are positioned adjacent wall 26. However, it should be understood that vertically extending members 74, 76 may be spaced from the wall, or completely self-standing away from any wall, depending on the placement need for support system 10. Other embodiments of support structures are within the scope of the disclosure, including support structures that extend from the hospital floor but do not touch the ceiling, support structures that extend from the ceiling and do not touch the floor, and support structures that extend from the wall. It is also contemplated that the support structure may extend from either the ceiling or floor and connect to the adjacent wall.

As can be seen in Fig. 17, multiple support structure frames may be placed adjacent each other to provide a support system 216 capable of supporting arms over a plurality of patient support devices 12.

Fig. 8 shows another embodiment for a patient care equipment support system 110, wherein a head wall 114 is provided, and cabinets 16, 18 and drawers 24 are omitted. Such an embodiment may be used where cabinetry is not needed, or as a lower-cost embodiment of support system 10. Head wall 114 may have a bed locator 116 mounted thereon. Head wall 114 is illustratively configured to have an arm support portion 118. Arm support portion 118 illustratively has an upper pier 120, a lower pier 122, and a channel 124 formed therebetween. Channel 124 is formed so that arms 28, 34, 42 can pivot about their pivot axes to extend through either side of channel 124.

As can be seen in cutaway views of first arm 28 in Figs. 9 and 10, a linear bearing assembly 126 supports second portion 64 for horizontal telescoping movement relative to first portion 58. Illustratively, first arm 28 includes a longitudinal bearing member 90 having a flat upper surface 92 and a lower surface 94 defining a V-shaped edge, as can be seen in Fig. 10. Upper bearing wheels 96 engage upper surface 92, and lower bearing wheels 98 define a V-shaped groove 99 for engagement with lower surface 94 of bearing member 90. Service lines 88 are grouped and integrated into an energy chain management system 100 to ensure tangle-free operation of the electrical lines and gas tubing. Illustratively, energy chain management system 100 is a flexible polymer chain link conduit that serves to guide the service lines through the telescoping arm while preventing their entanglement with each other or other objects. The "S"-shape and the flexibility accommodate the telescoping movement of the arm. Although any number of services lines can be grouped into energy chain management system 100, the illustrative embodiment uses a 7-conduit energy chain management system. It should be understood, of course, that any number of conduits is within the scope of the disclosure. Energy chain management system 100 is commercially available through Igus Inc. of East Providence, Rhode Island, and is marketed under the trademark E-Chain, however, it should be understood that variations and alternative constructions to energy chain management system 100 are within the scope of the disclosure, as well as other constructions for first arm 28 as a whole. Fig. 33 shows first, second and third arms 28, 34, 42 without decorative coverings thereon.

One embodiment of a brake system 102 for arms 28, 34, 42 is illustrated in Figs. 11-12. Additional embodiments are illustrated in Figs. 46-51, described further herein. Illustratively, either brake system is employed in each of arms 28, 34, 42 so that each of arms 28, 34, 42 pivoting movement can be impeded. The illustrative brake system 102 of Figs. 11-12 includes a strap or belt 104, illustratively comprised of rubber or metal, fixed at one end 106 and connected to a tightener 108 at a second end 112. Illustratively, end 106 forms a loop for engagement with hook 107 (which is coupled to side support 85) and second end 112 forms a loop for engagement with pin 128 of over-center linkage 111. Illustratively, strap 104 is wrapped around collar 144, to which one of arms 28, 34, 42 is fixedly

attached. When tightener 108 is in the tightening position, strap 104 is pulled tightly to constrict around collar 144 such that pivoting movement of the attached arm is impeded, and in some embodiments, is altogether prevented. When a caregiver desires to move the selected arm, a button or other user-input such as a handle, lever, switch, knob, and the like (not shown, but located in any convenient location for access by a caregiver - for example at a shoulder-height position on a column depending from the selected arm) can be manipulated by a user, thereby releasing tightener 108 and loosening strap 104 to permit movement of the arm about pivot axis 40.

Illustratively, tightener 108 comprises a linear actuator 109 coupled to an over-center linkage 111. As can be seen in Fig. 12, over-center linkage 111 illustratively comprises two links 130, 132 arranged substantially in parallel. At one end, links 130, 132 are pivotably mounted to U-shaped bracket 134 via pins 136. At the other end, links 130, 132 are pivotably mounted to linear actuator 109 via pin 138. Linear actuator 109 is pivotably mounted to bracket 140 via pin 141 and fasteners 142 join bracket 140 to a cross member (removed from view for clarity) mounted to extend horizontally between vertically extending members 74, 76. When linear actuator 109 is actuated, piston 146 extends from actuator 109, thereby pivoting links 130, 132 about pins 136. As links 130, 132 pivot about pins 136, pin 128 moves closer to collar 144, thereby releasing tension on strap 104 to permit movement of the arm about pivot axis 40. Linear actuator 109 is permitted to pivot about pin 141 during such movement. When linear actuator 109 is retracted, links 130, 132 pivot about pins 136 such that pin 128 exerts tension on strap 104, restricting movement of collar 144. After pin 128 has passed the center-point, or the point at which strap 104 was parallel to links 130, 132, tension from strap 104 causes pin 128 to exert pressure downwardly toward actuator 109, effectively preventing the accidental release of tension in strap 104 until actuator 109 is again actuated.

In the illustrative embodiment, when tightener 108 is in the tightened condition, a caregiver may still be able to pivot the arm about axis 40 with a predetermined amount of force. Thus, the arm is able to be moved even in the event of a power or equipment failure. However, during normal operation, a caregiver engages the button which moves the actuator to loosen the strap 104 and then moves

the arm to the desired position. When the arm and column reach the desired position, the button is released and the tightener 108 reactivated.

Two additional embodiments for brake systems can be seen in Figs. 46-51. The illustrative brake system 258 shown in Figs. 46-48 can be used similarly to brake system 102 to impede pivoting movement of collar 144, which is connected to one of arms 28, 34, 42. Illustratively, brake system 258 comprises a first caliper arm 260 and a second caliper arm 262 that pivot about pins 264, 266, respectively. Caliper arms 260, 262 may have brake pads 270 coupled thereto for engagement with the outer surface of collar 144. A linear actuator 272 is illustratively provided for moving caliper arms 260, 262 between the brake-engaged position shown in Figs. 46-47 and the brake-released position shown in Fig. 48, wherein collar 144 and its attached arm can pivot. In the brake-engaged position, plunger 273 causes arms 274 to exert pressure on the caliper arms 260, 262, thereby causing brake pads 270 to engage collar 144. In the brake-released position shown in Fig. 48, linear actuator 272 causes plunger 273 to move away from collar 144, thereby causing arms 274 to spread the caliper arms 260, 262 apart from collar 144.

In the brake system embodiment illustrated in Figs. 49-51, a caliper arm 306 has at least one tooth 308 formed thereon for engaging gear 268 mounted on collar 144. Caliper arm 306 pivots about pin 310 and is spring loaded (spring not shown in illustration). The tooth 308 interlocks with teeth on gear 268 to create a brake-engaged position as shown in Fig. 50. When it is desired to release the brake system from the brake-engaged position, linear actuator 272 retracts plunger 273, causing caliper arm 306 to pivot about pin 310, thereby moving tooth 308 out of engagement with gear 268 to the brake-released position shown in Fig. 51.

It should be understood that other brake systems may be utilized, or that no brake system may be utilized for arms 28, 34, 42. It should be understood that while the present disclosure illustrates a single telescoping arm 28 and a plurality of fixed-length arms 34, 42, it is within the scope of the disclosure to utilize any combination of fixed-length arms and telescoping arms, or to utilize only fixed-length arms (which may or may not be constructed of varying lengths) or to utilize only telescoping arms. It is further within the scope of the disclosure to utilize just one pivotable arm, whether fixed in length or telescoping.

As can be seen in Fig. 13, an equipment support cart 150 is also disclosed for supporting equipment support 30 adjacent a patient support device 12. Mount post 70 extends below equipment support 30 to engage a post receiver 152 on equipment support cart 150. Illustratively, patient support device 12 also includes a post receiver 154 configured to receive the end 156 of mount post 70. When it is desired to position equipment support 30 on patient support device 12 and disconnect support 30 from equipment support cart 150, end 156 is positioned over post receiver 154 and release pedal 160 is depressed on equipment support cart 150. End 156 of mount post 70 illustratively comprises a tapered collar having a protrusion 162 extending therefrom. Release pedal 160 allows telescoping column 158 of equipment support cart 150 to retract so that end 156 of mount post 70 can engage post receiver 154. Post receiver 152 comprises a substantially C-shaped cross-section that permits the passage of end 156 therethrough, while engaging protrusion 162 on mount post 70. Therefore, once end 156 is in place, post receiver 152 of equipment support cart 150 can be lowered below protrusion 162 and disengaged from mount post 70, permitting equipment support cart 150 to be moved away from patient support device 12. Equipment support 30 may be mounted to a frame member of patient support device 12, such frame member being either vertically movable or fixed relative to a hospital floor.

When it is desired to again position equipment support 30 on equipment support cart 150, post receiver 152 can engage end 156 below protrusion 162, and lift pedal 164 can be actuated to extend telescoping column 158 upwardly to engage protrusion 162, lifting equipment support 30 off of patient support device 12.

A partial list of features of various elements in the disclosure has been attached as Attachment A.

The illustrated embodiments provide for flexible arrangement of patient care devices, permitting a patient's care to be tailored to various levels of acuity without movement between rooms or support systems 10. Cords and lines running below the patient support device can be reduced or eliminated. Unused portions of such patient care devices can be stowed in cabinets 16, 18 or moved out of the way, facilitating care of the patient and movement about the patient. Such a support system 10 can eliminate the need for IV stands near a patient support device

12. Furthermore, the support system 10 removes from the patient's direct overhead view the ceiling-mounted arm support structure.

Although the invention has been described in detail with reference to certain illustrative embodiments, variations and modifications exist with the scope and spirit of this disclosure as described and defined in the following claims.

CLAIMS

1. A patient care equipment support system comprising

an upwardly extending support structure,

a first arm mounted to the support structure for pivotable movement in a first horizontal plane, the first arm carrying a column, and

a second arm mounted to the support structure for pivotable movement in a second horizontal plane, the second arm carrying a second column.

2. The system of claim 1, wherein the first arm is telescoping and comprises a first portion having a mount end, a distal end extending away from the mount end, and a second portion coupled to the distal end of the first portion and configured to telescope relative to the first portion.

3. The system of claim 2, wherein the second portion of the first arm is not pivotable relative to the first portion.

4. The system of claim 1, wherein the first arm extends in a first radial direction in the first plane and the second arm extends in a second radial direction in the second plane.

5. The system of claim 4, wherein the first and second arms can be moved such that the first arm extends in the second radial direction in the first plane and the second arm extends in the first radial direction in the second plane.

6. The system of claim 5, wherein one of the first and second arms telescopes when passing around the other of the first and second arms.

7. The system of claim 1, wherein at least one of the first and second arms is constructed of tubular metal and is configured to carry a plurality of service conduits therein.

8. The system of claim 7, wherein the service conduits supply at least one service selected from the group comprising: medical air, oxygen, vacuum, electronic data connectivity, and electricity.

9. The system of claim 1, further comprising a console having a space configured to receive the first and second arms when the first and second arms are in a storage position.

10. The system of claim 9, wherein the console has a first cabinet on one side of the support structure and a second cabinet on the other side of the support structure.

11. The system of claim 10, wherein each of the first and second arms can be stored in either of the first and second cabinets.

12. The system of claim 1, further comprising a third arm mounted on the support structure for pivotable movement in a third horizontal plane, the third arm carrying a third column.

13. The system of claim 12, wherein the first arm comprises a recess configured to receive a portion of the third arm when the third arm is positioned adjacent the first arm.

14. The system of claim 12, wherein the second arm comprises a recess configured to receive a portion of the third arm when the third arm is positioned adjacent the second arm.

15. The system of claim 12, wherein the third arm comprises two support members in spaced apart relation to each other.

16. The system of claim 1, wherein the first and second arms pivot about a common vertical axis.

17. The system of claim 1, wherein the first arm pivots about a first axis and the second arm pivots about a second axis, the first and second axes not being coaxially aligned.

18. The system of claim 17, wherein the first arm is configured to extend toward a first patient support device and the second arm is configured to extend toward a second patient support device.

19. The system of claim 17, wherein the first arm is configured to extend toward one side of a patient support device and the second arm is configured to extend toward the other side of the patient support device.

20. The system of claim 19, wherein the first and second arms are telescoping.

21. A patient care equipment support system comprising

a vertically disposed support structure,

a first arm pivotably mounted to extend horizontally from the support structure,

a column coupled to the first arm, and

a console configured to house at least a portion of the support structure.

22. The system of claim 21, wherein the console comprises a cabinet for housing the column.

23. The system of claim 21, wherein the console comprises a contoured panel configured to receive a head end of a patient support device.

24. The system of claim 23, wherein the contoured panel has a substantially concave cross-section.

25. The system of claim 23, further comprising a service port mounted on the contoured panel, the service port providing at least one service selected from the group comprising: medical air, oxygen, vacuum, electronic data connectivity, and electricity.

26. The system of claim 23, further comprising a light mounted on the contoured panel.

27. The system of claim 21, wherein the support structure comprises at least two vertically extending support members having an arm mount portion disposed therebetween.

28. The system of claim 27, wherein the arm mount portion comprises an upper platform and a lower platform and the first arm is pivotably mounted therebetween.

29. The system of claim 21, wherein the first arm is telescoping.

30. The system of claim 21, further comprising a patient monitor coupled to the column.

31. The system of claim 30, wherein the patient monitor is configured to report a status of the patient to a caregiver.

32. The system of claim 30, wherein the patient monitor is configured to transmit television programming to the patient.

33. The system of claim 30, wherein the patient monitor is configured to transmit educational programming to the patient.

34. The system of claim 21, further comprising a light mounted on the column.

35. The system of claim 21, further comprising a patient transfer device mounted on the first arm.

36. The system of claim 21, wherein the column comprises an equipment support.

37. The system of claim 36, wherein the equipment support is configured to be detachable and mountable on an equipment support receiver.

38. The system of claim 37, wherein the equipment support receiver is mounted inside the console.

39. The system of claim 36, wherein the equipment support is vertically movable relative to the first arm.

40. A patient care equipment support system comprising

an upwardly extending support structure defining a vertical axis,

an arm extending outwardly from the support structure and movable about the axis,

a column coupled to the arm for movement therewith, and

a brake system configured to impede pivoting movement of the arm when the brake system is activated, the brake system having a braked condition and a non-braked condition.

41. The system of claim 40, wherein the brake system is controlled by a user input device.

42. The system of claim 41, wherein the user input device is one selected from the group comprising a button, a handle, a lever, a switch, and a knob.

43. The system of claim 41, wherein the user input device is mounted on the column.

44. The system of claim 41, wherein the user input device is mounted remote from the column.

45. The system of claim 41, wherein the user input device is movable between a first position wherein the arm is freely movable and a second position wherein the brake impedes pivoting movement of the arm.

46. The system of claim 40, wherein the arm has a collar coupled thereto, the collar being concentrically aligned with the vertical axis.

47. The system of claim 46, wherein the brake system comprises a strap configured to be wrapped around a portion of the collar.

48. The system of claim 47, wherein the brake system further comprises a linear actuator coupled to the strap, the linear actuator having a strap-tightening position and a strap-releasing position.

49. The system of claim 46, wherein the brake system comprises a gear mounted on the collar.

50. The system of claim 49, wherein the brake system further comprises a toothed caliper arm for engaging the collar-mounted gear.

51. The system of claim 46, wherein the brake system comprises a brake pad engageable with the collar.

52. The system of claim 51, wherein the brake system further comprises a caliper for moving the brake pad into and out of engagement with the collar.

53. The system of claim 40, wherein the arm is a telescoping arm.

54. The system of claim 40, wherein the arm is a fixed-length arm.

55. A patient support device comprising

a mattress configured to support a patient thereon,

a frame configured to support the mattress thereon, the frame having a frame member,

a rail coupled to the frame member, the rail providing a horizontally disposed surface,

a slider coupled to the rail for movement relative to the rail, and

an equipment carrier coupled to the slider, the equipment carrier being configured to receive a patient care equipment support thereon.

56. The patient support device of claim 55, wherein the frame has a head end and a foot end and the horizontally disposed surface extends substantially along one of the head end and the foot end.

57. The patient support device of claim 55, wherein the slider is configured to slide horizontally relative to the rail.

58. The patient support device of claim 55, wherein the frame has four corners and the slider is configured to move between two adjacent corners of the frame.

59. The patient support device of claim 55, further comprising a lock coupled to the slider, the lock being configured to lock movement of the slider relative to the rail.

60. The patient support device of claim 59, wherein the lock is a pull knob having a plunger coupled thereto.

61. The patient support device of claim 60, wherein the pull knob is actuatable between an unlocked position wherein the slider is movable relative to the rail and a locked position wherein the plunger engages an aperture in the rail.

62. The patient support device of claim 55, wherein the patient care equipment support comprises a downwardly extending post and the equipment carrier comprises a vertically disposed post receiver configured to receive the post.

ABSTRACT OF THE DISCLOSURE

A system for supporting patient care equipment alongside a patient-support device is provided. In one embodiment, the system includes a plurality of arms supported by a support structure. The arms may be pivoted to either side of the patient-support device. The arms may be stored in a console. At least one of the arms may carry service conduits that provide medical air, oxygen, vacuum, or electricity. The arms may have a brake system for impeding the pivotable movement of the arms.

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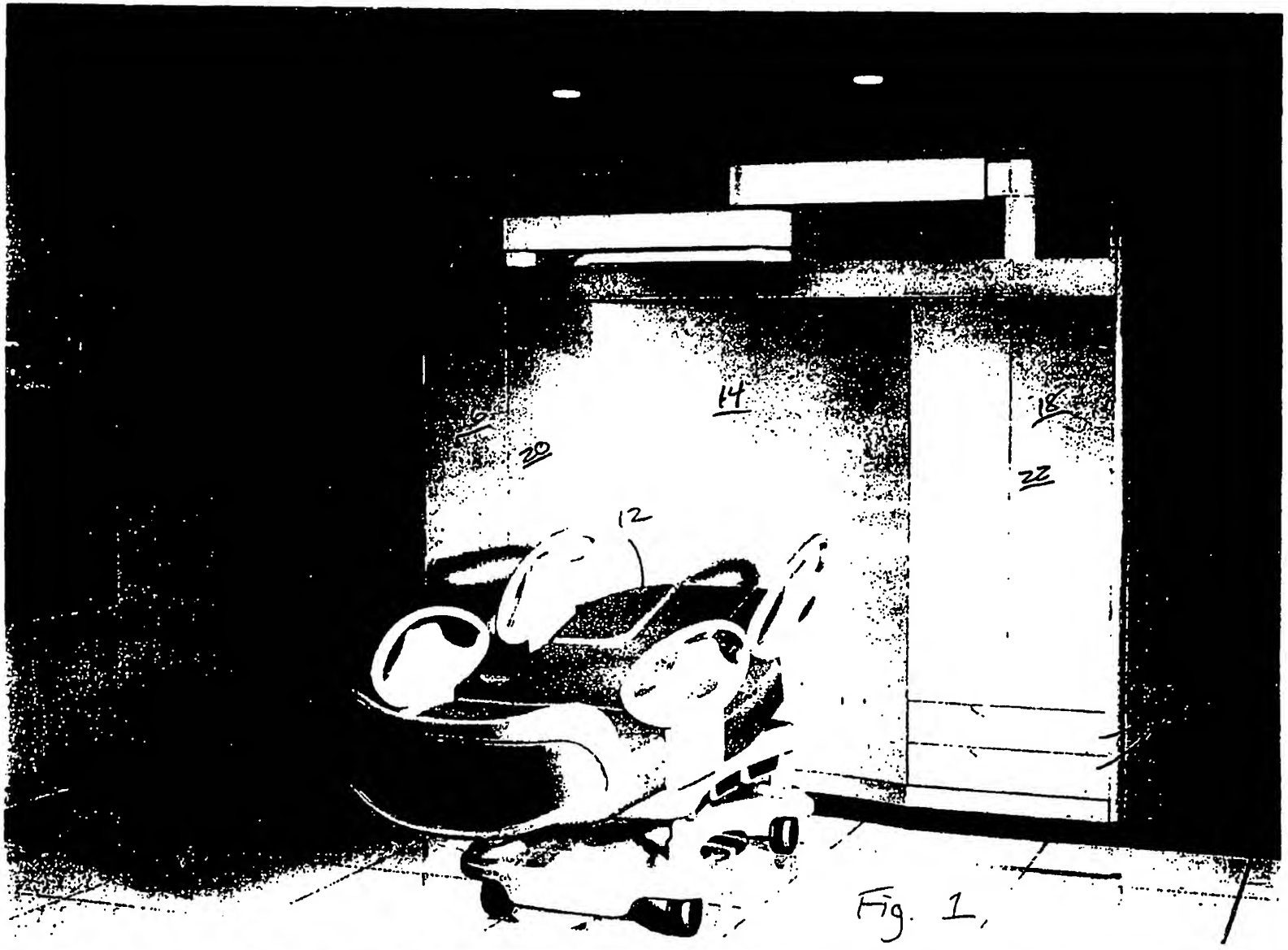

Fig. 1.

Universal Wall Arm Patent Application

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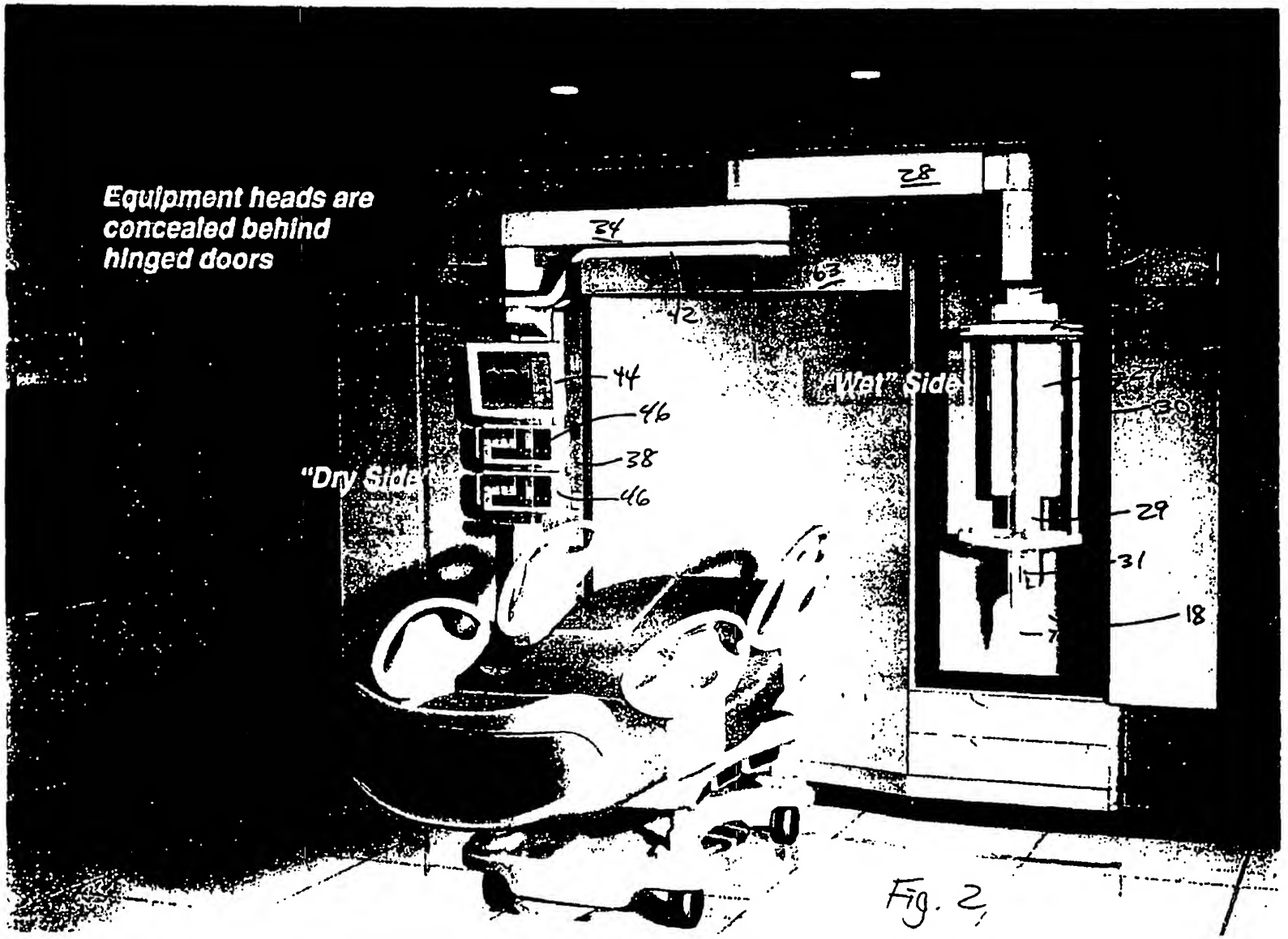
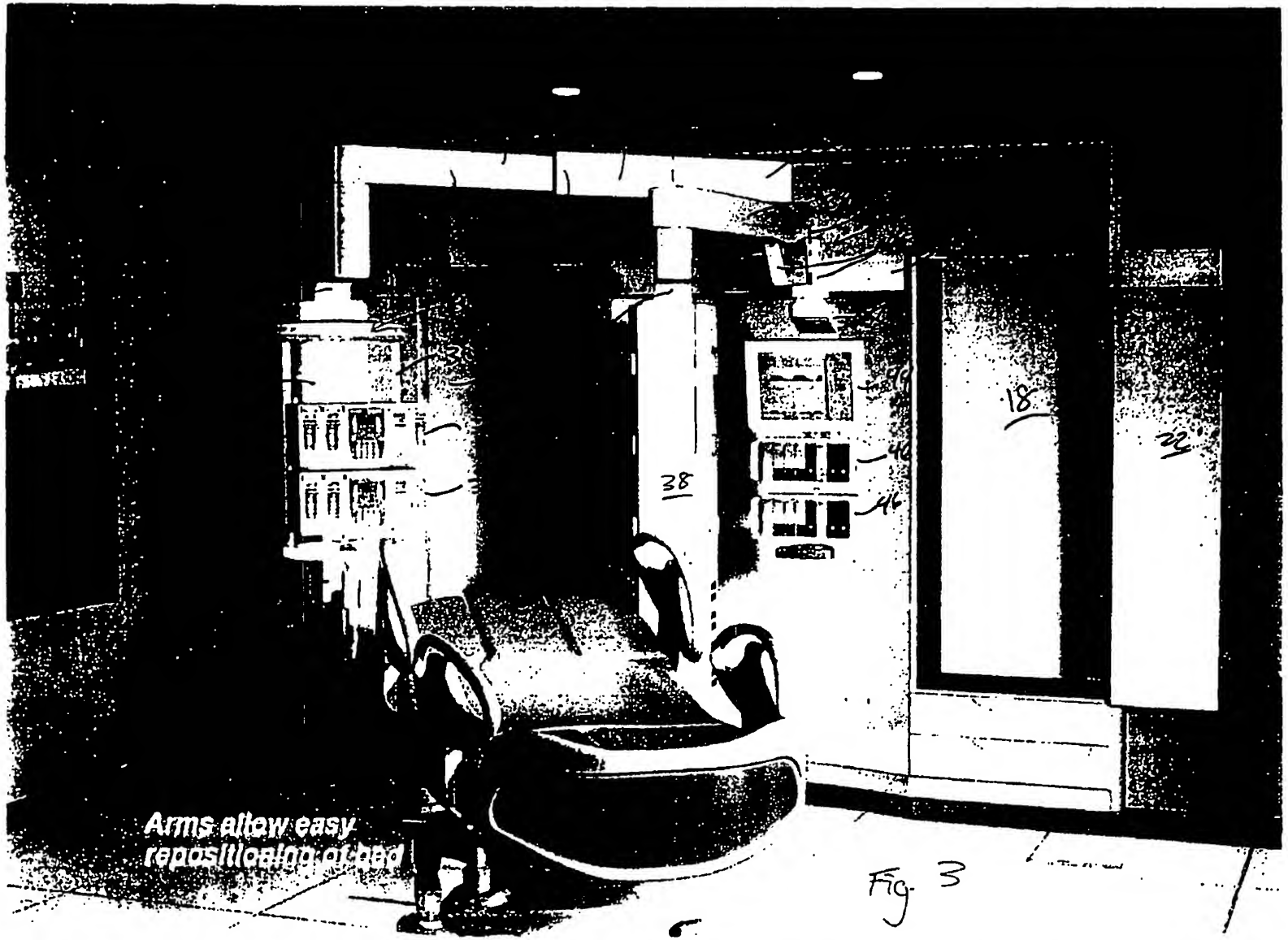


Universal Wall Arm Patent Application



Universal Wall Arm Patent Application

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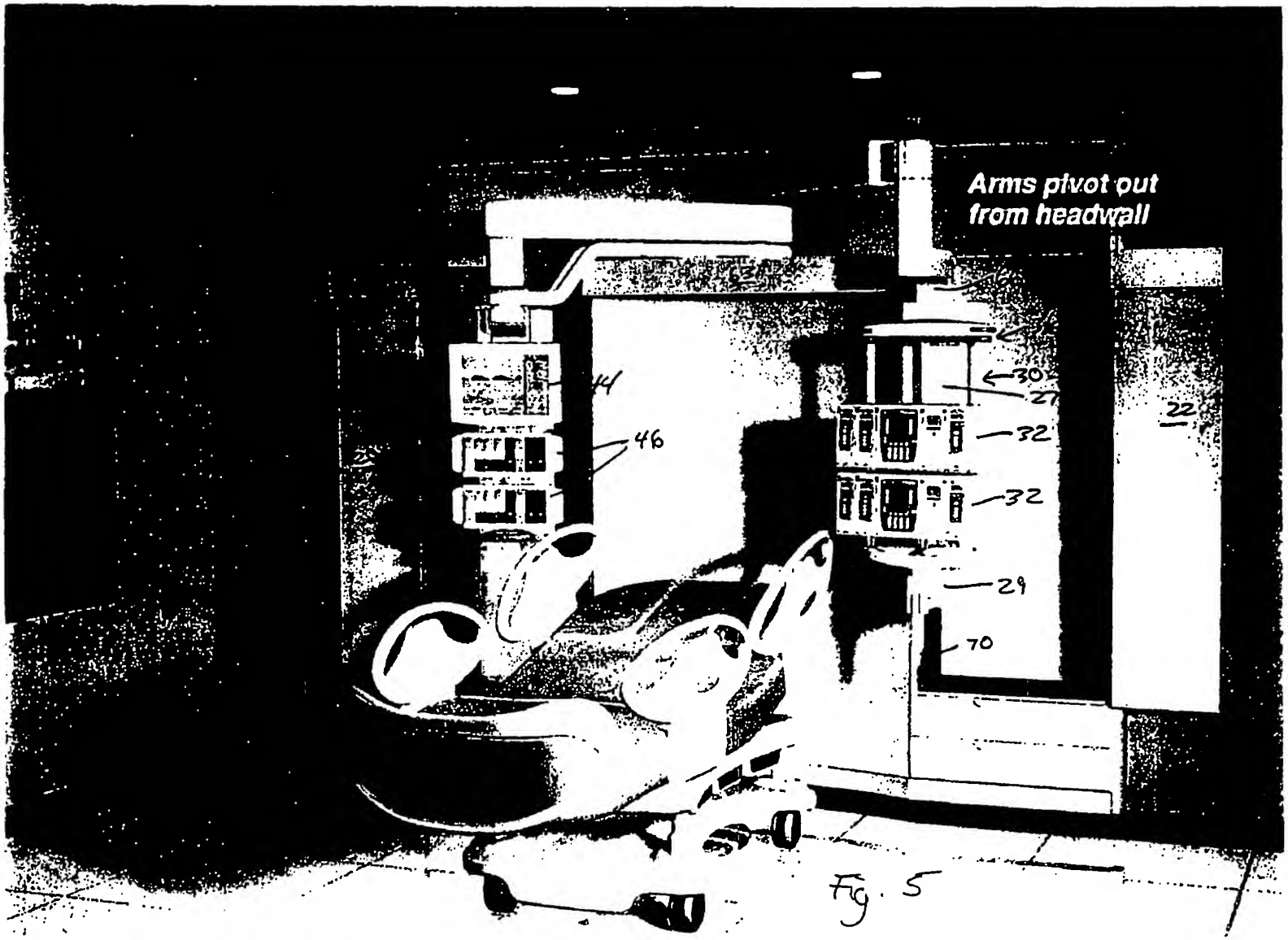

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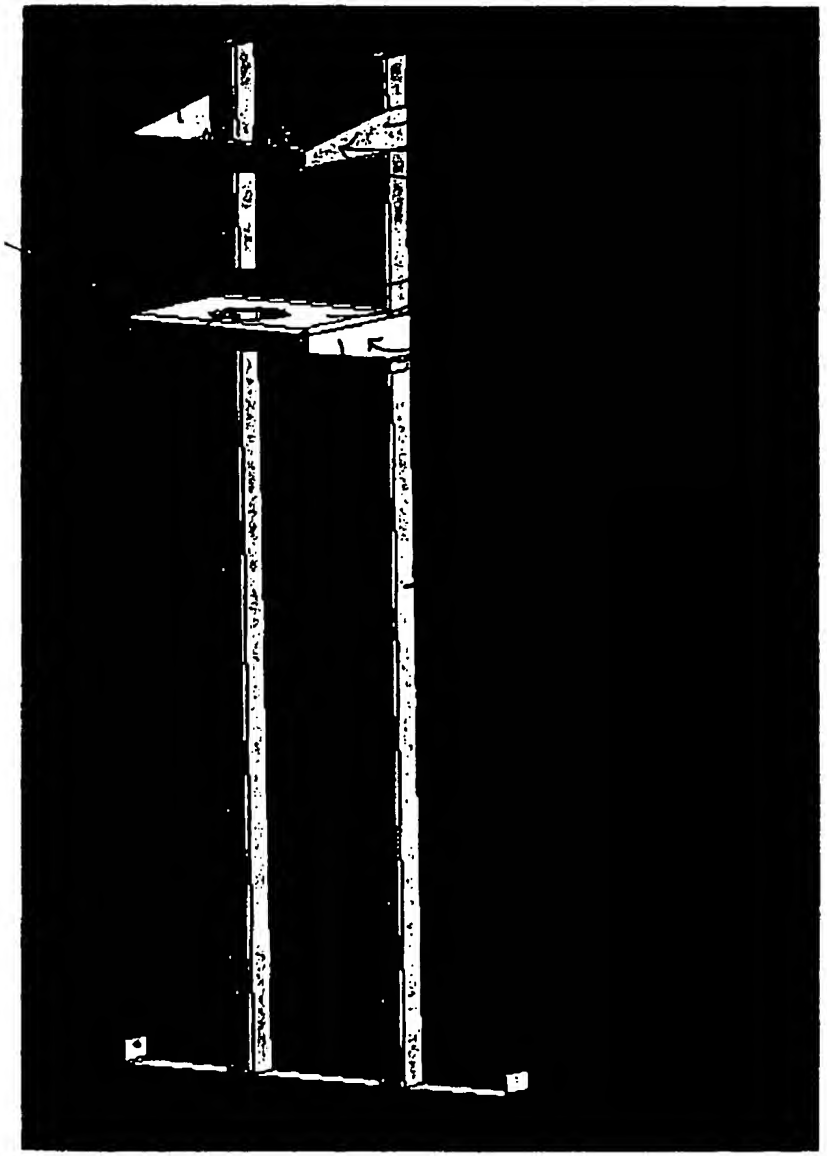
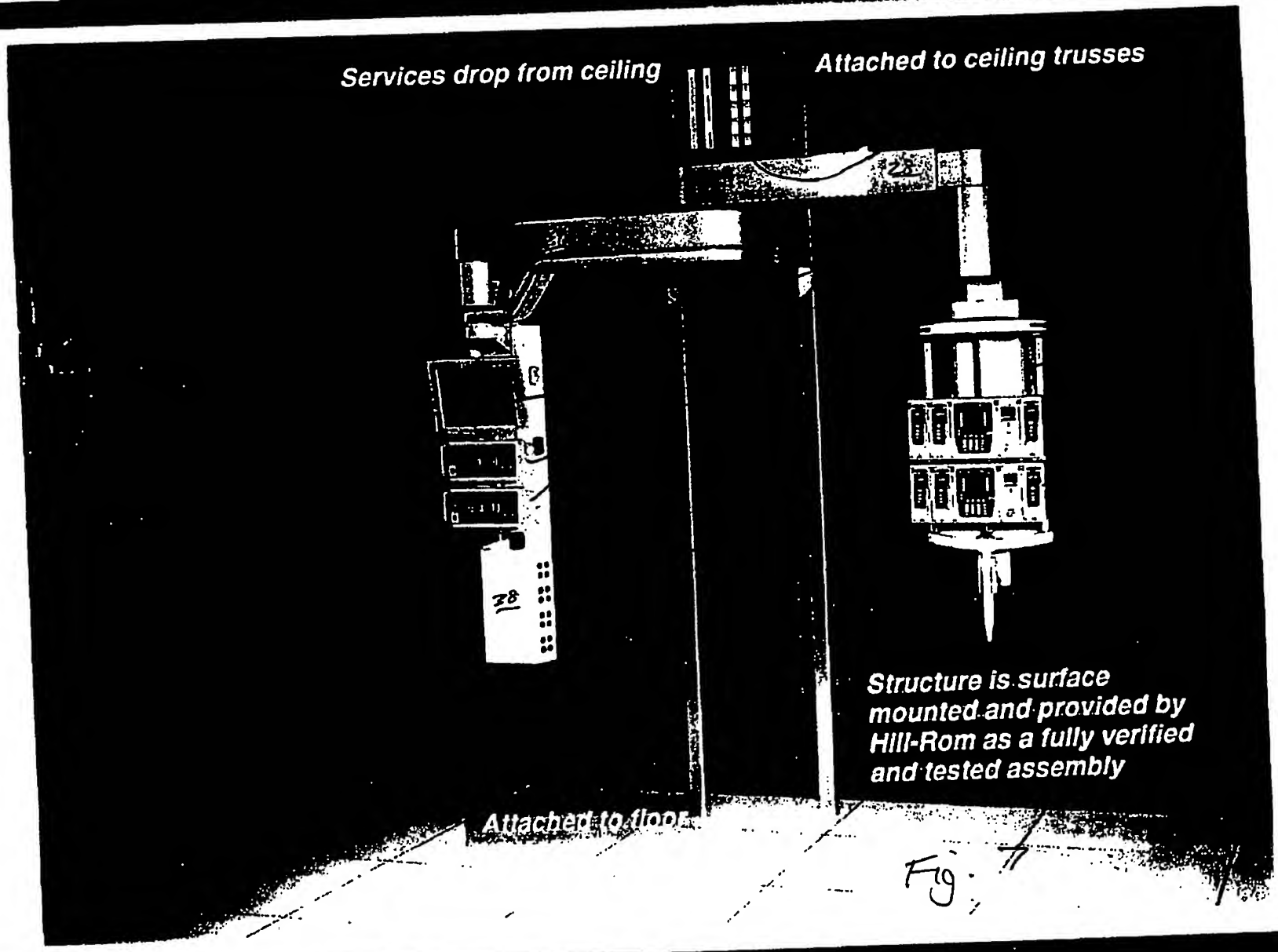
Universal Wall Arm
Hidden Structure

Fig. 6





Universal Wall Arm Patent Application

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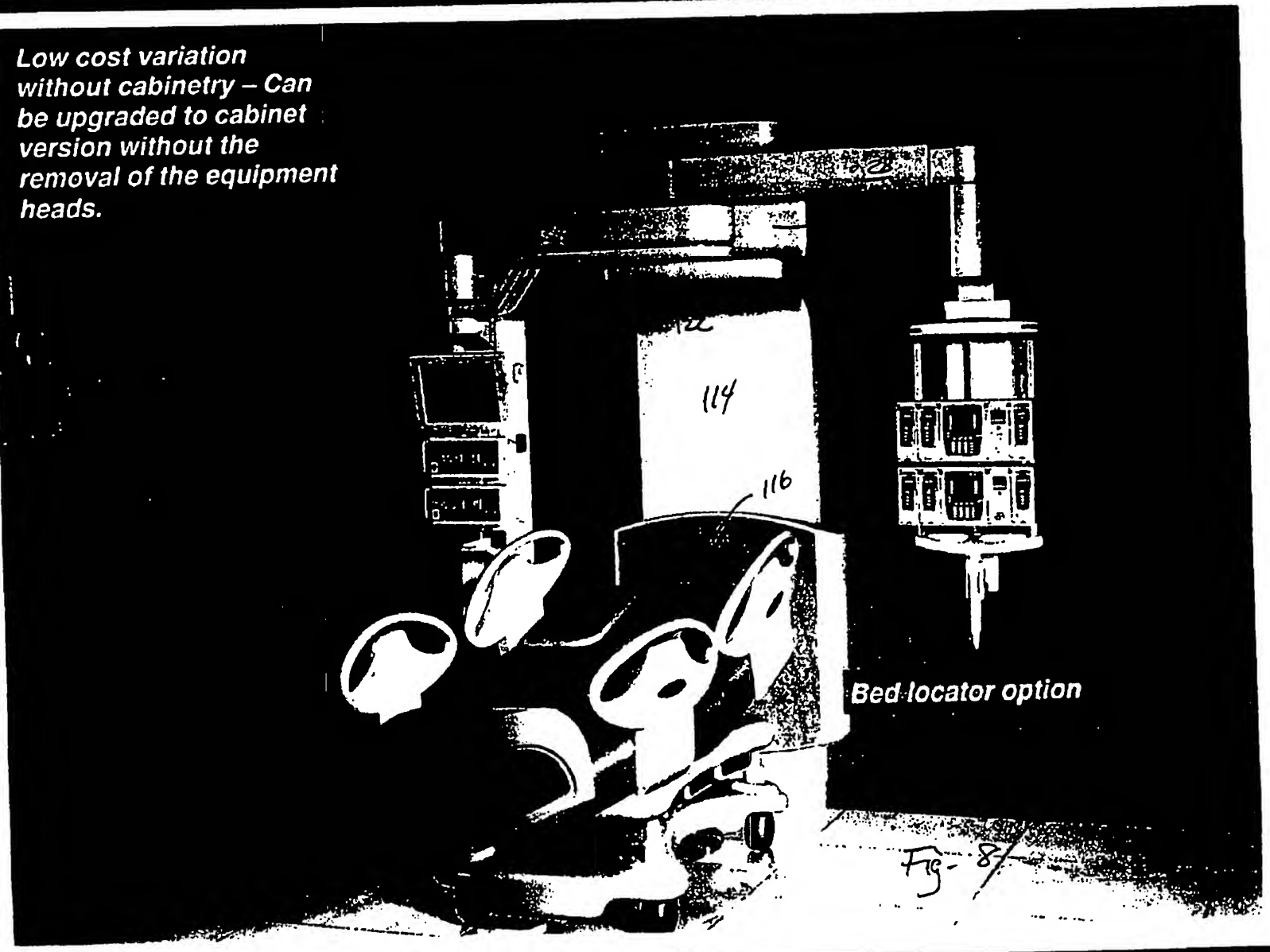
Low cost variation without cabinetry – Can be upgraded to cabinet version without the removal of the equipment heads.



Universal Wall Arm Patent Application

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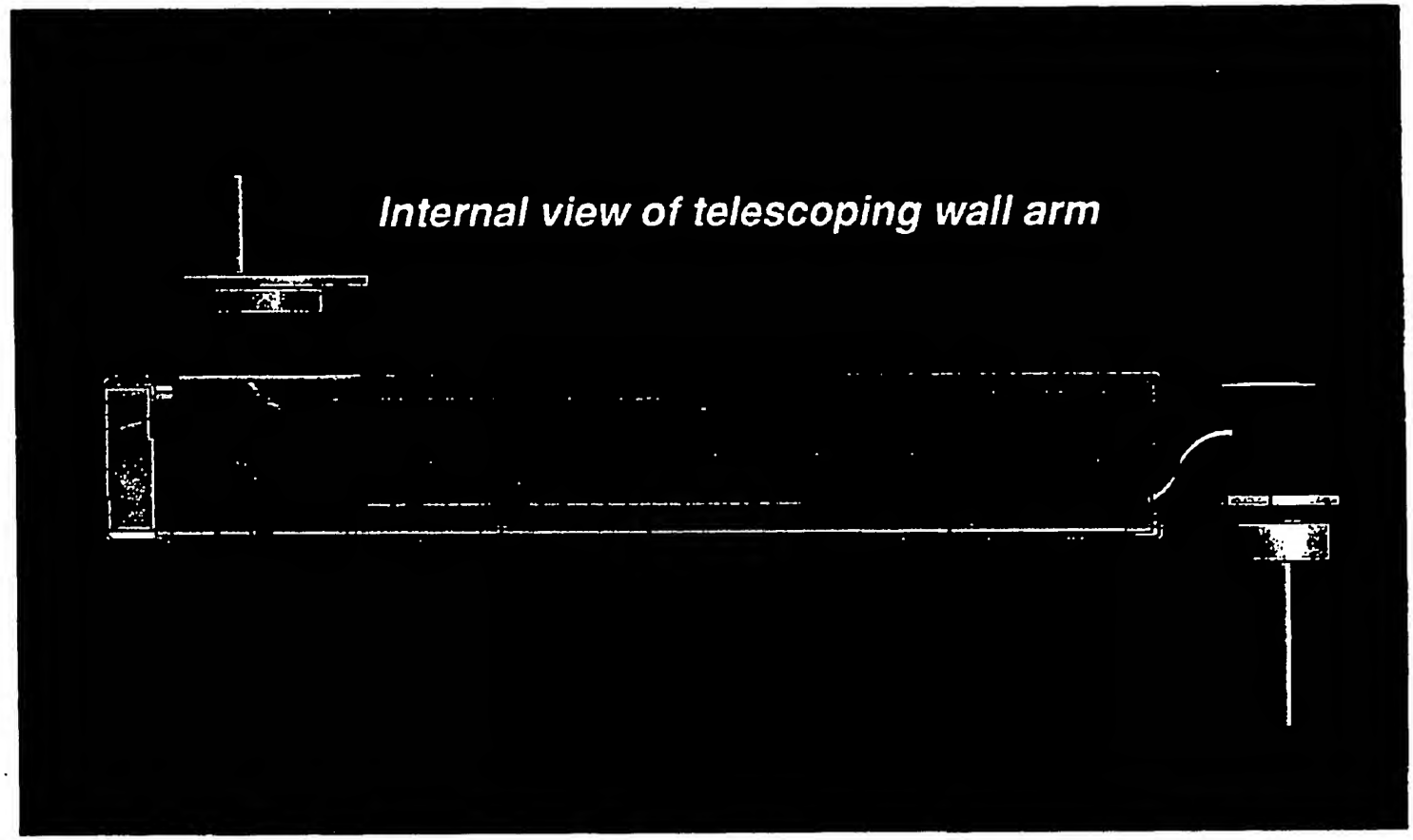

Fig- 9

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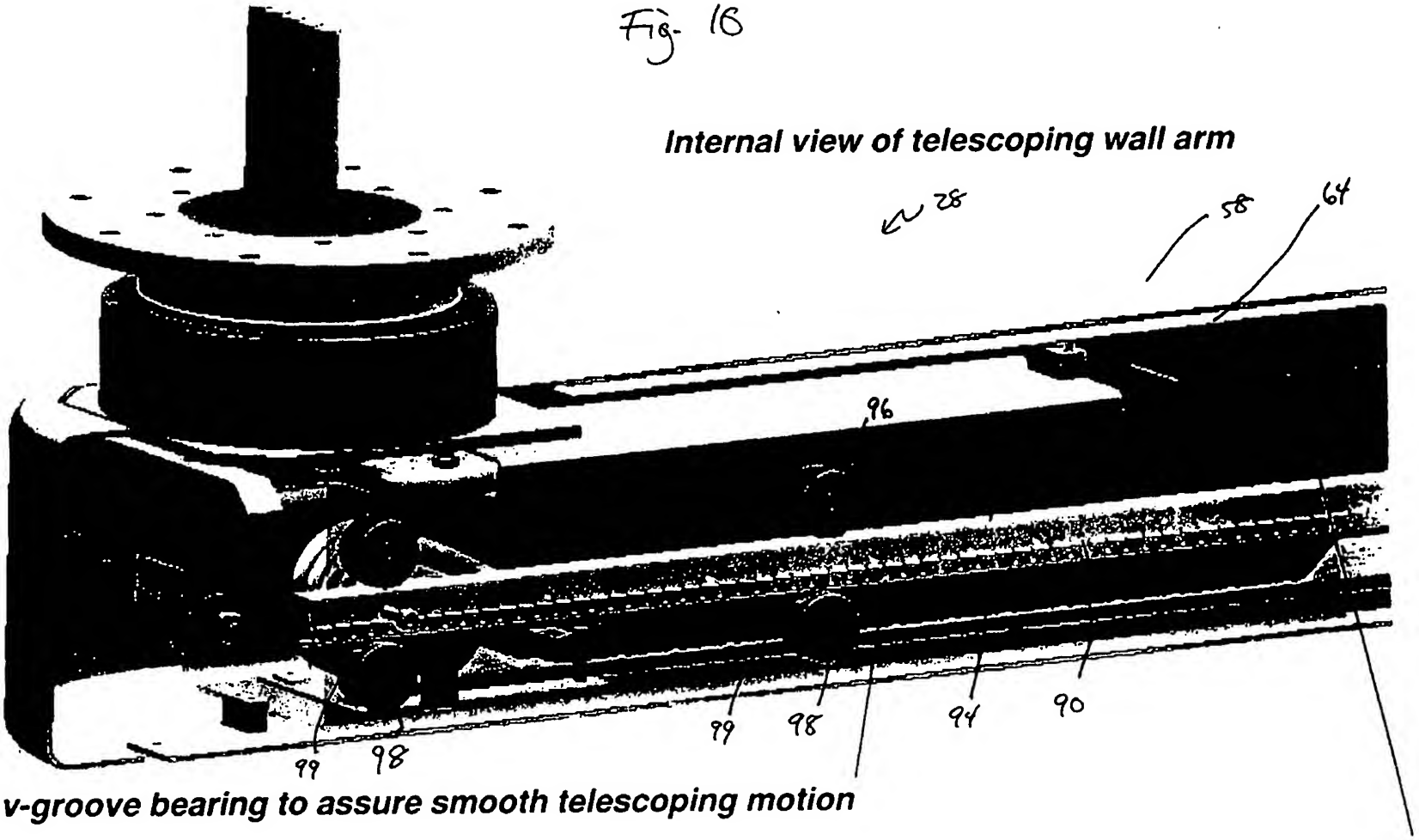
Fig. 16

Internal view of telescoping wall arm



Linear v-groove bearing to assure smooth telescoping motion

Energy chain management system to ensure tangle free operation of electrical lines and gas tubing

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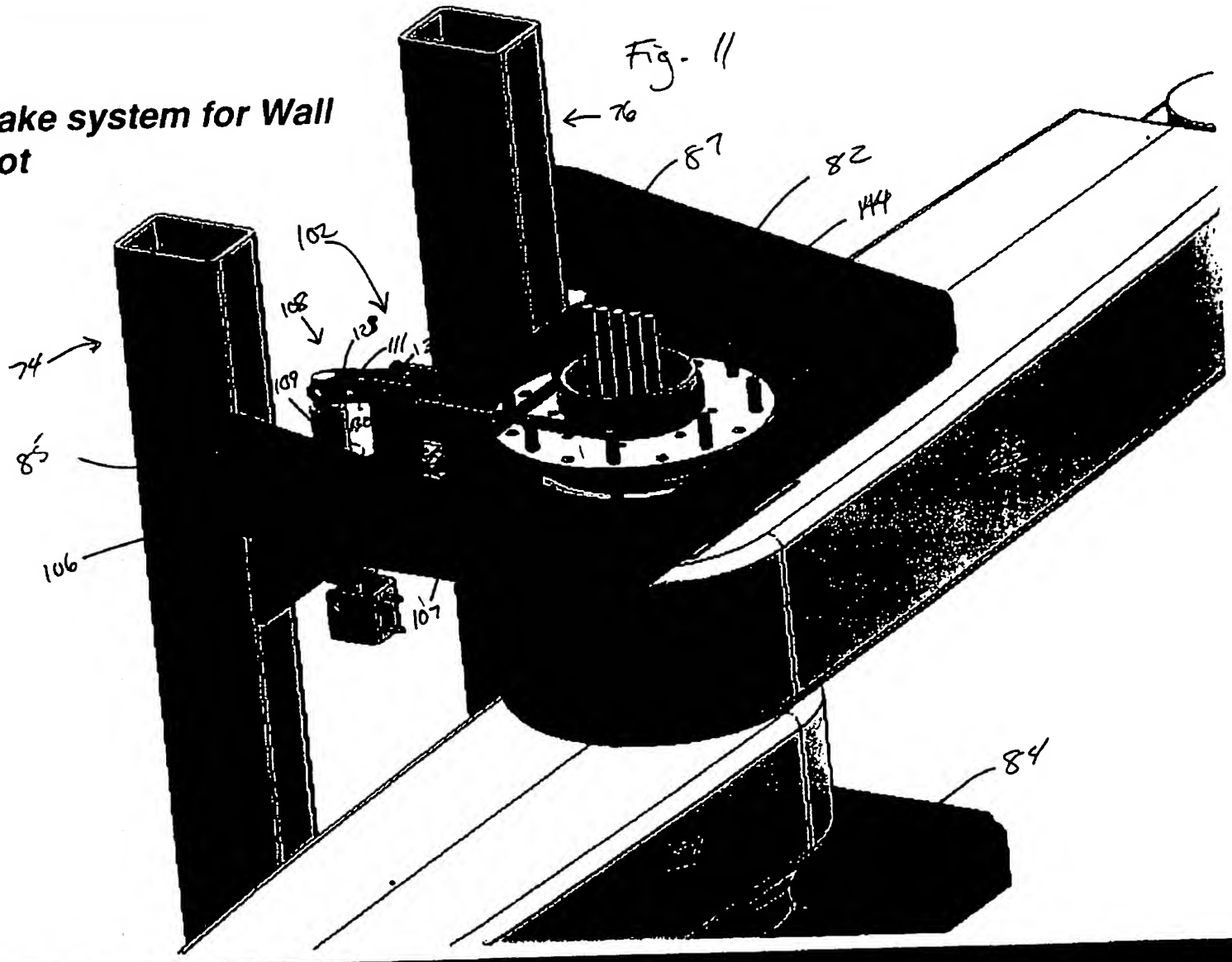
Wrap brake system for Wall Arm pivot



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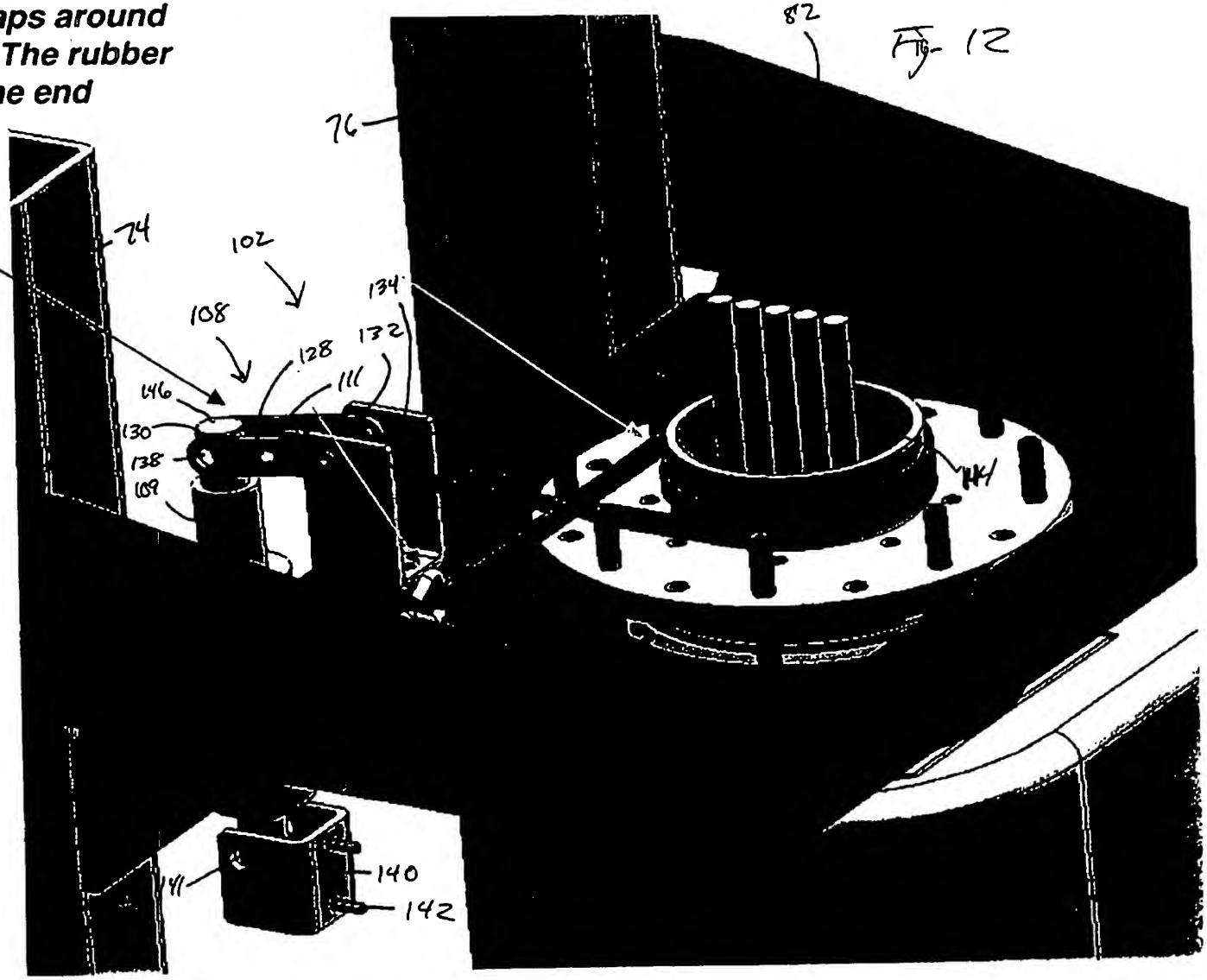
A rubber strap wraps around pivoting arm hub. The rubber strap is fixed at one end

The rubber strap is pulled tight through an over-center linkage with a linear actuator



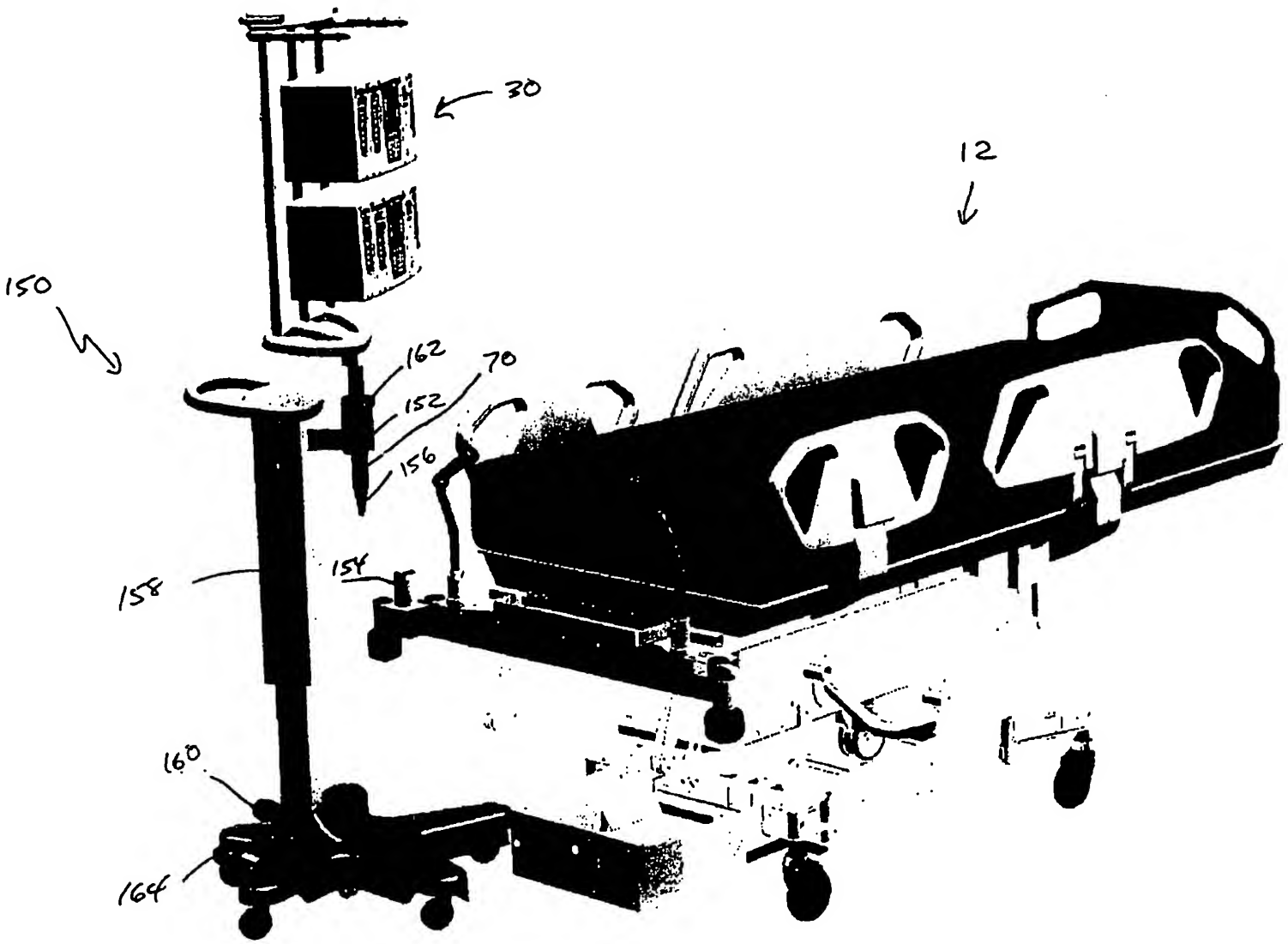


Fig. 13

Fig. 14

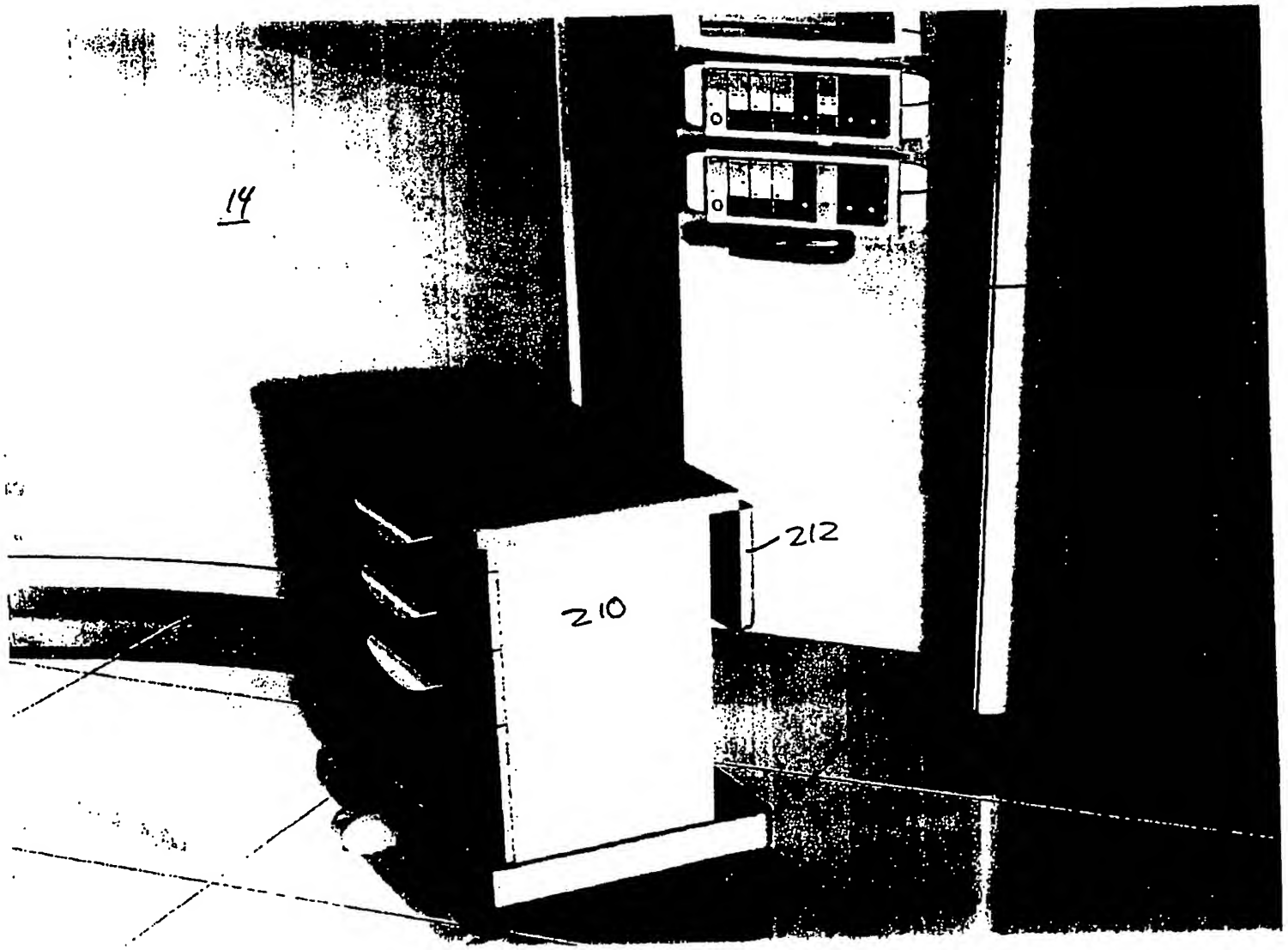


Fig. 15

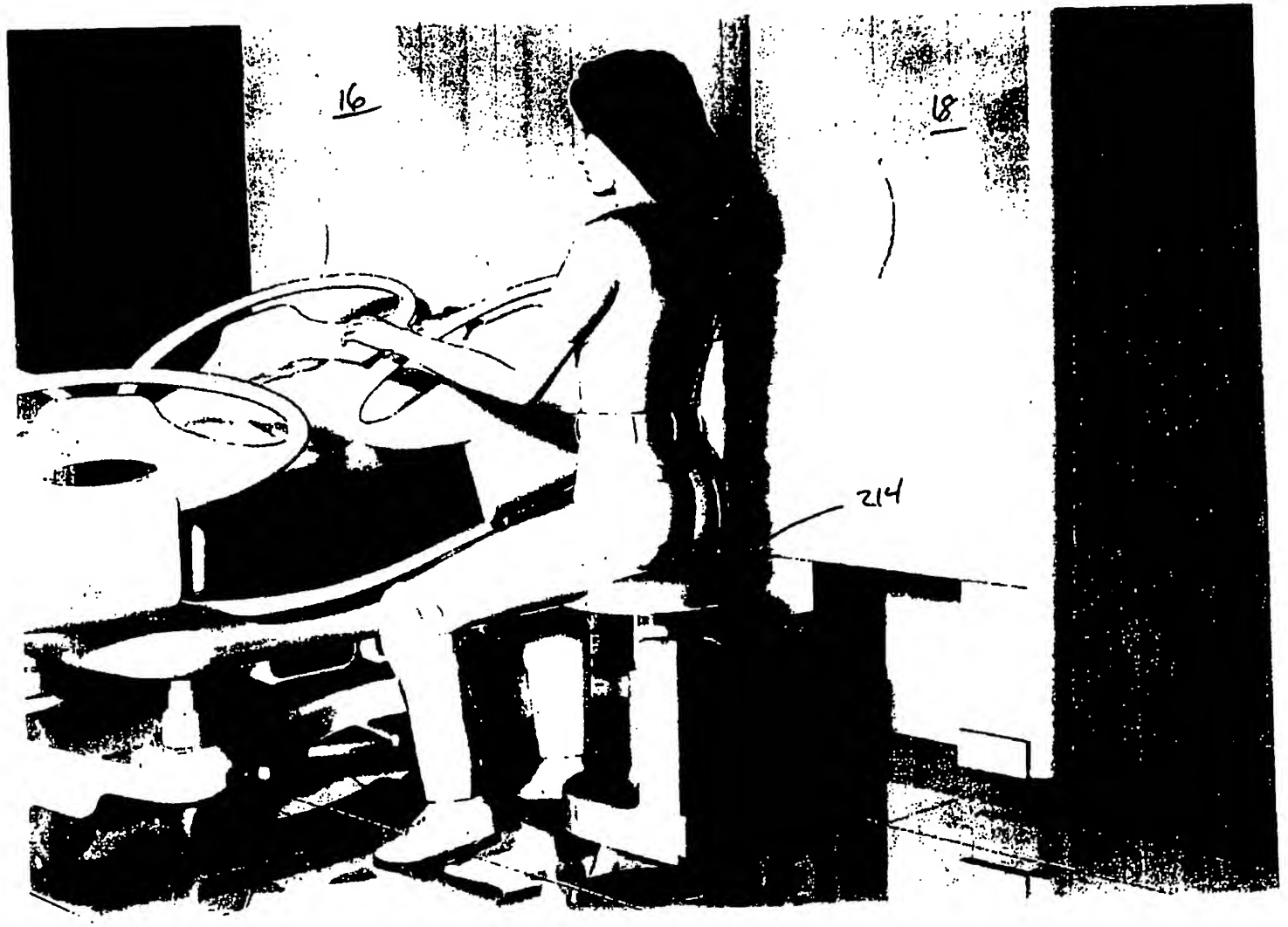


Fig. 16


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Fig. 18

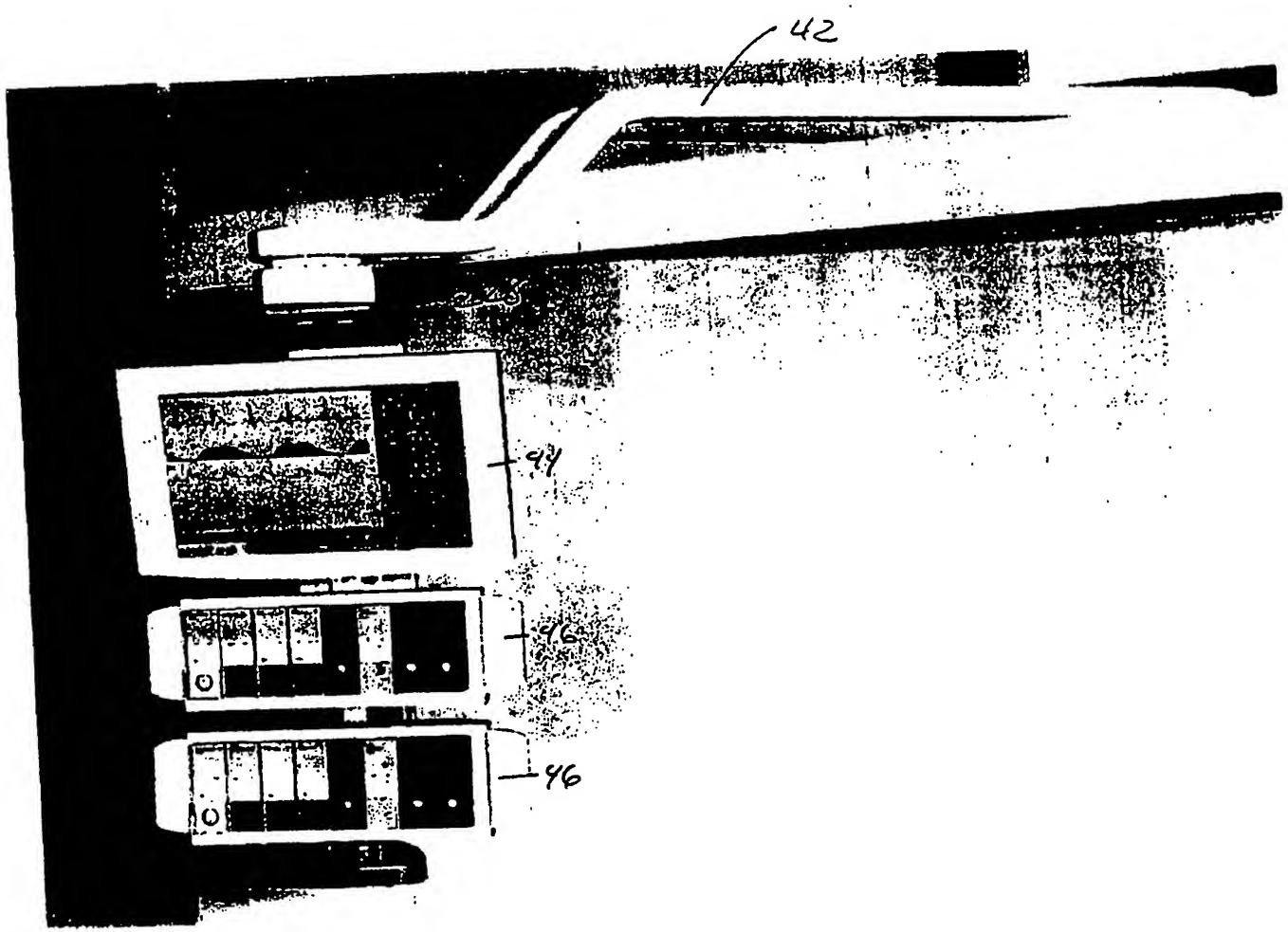
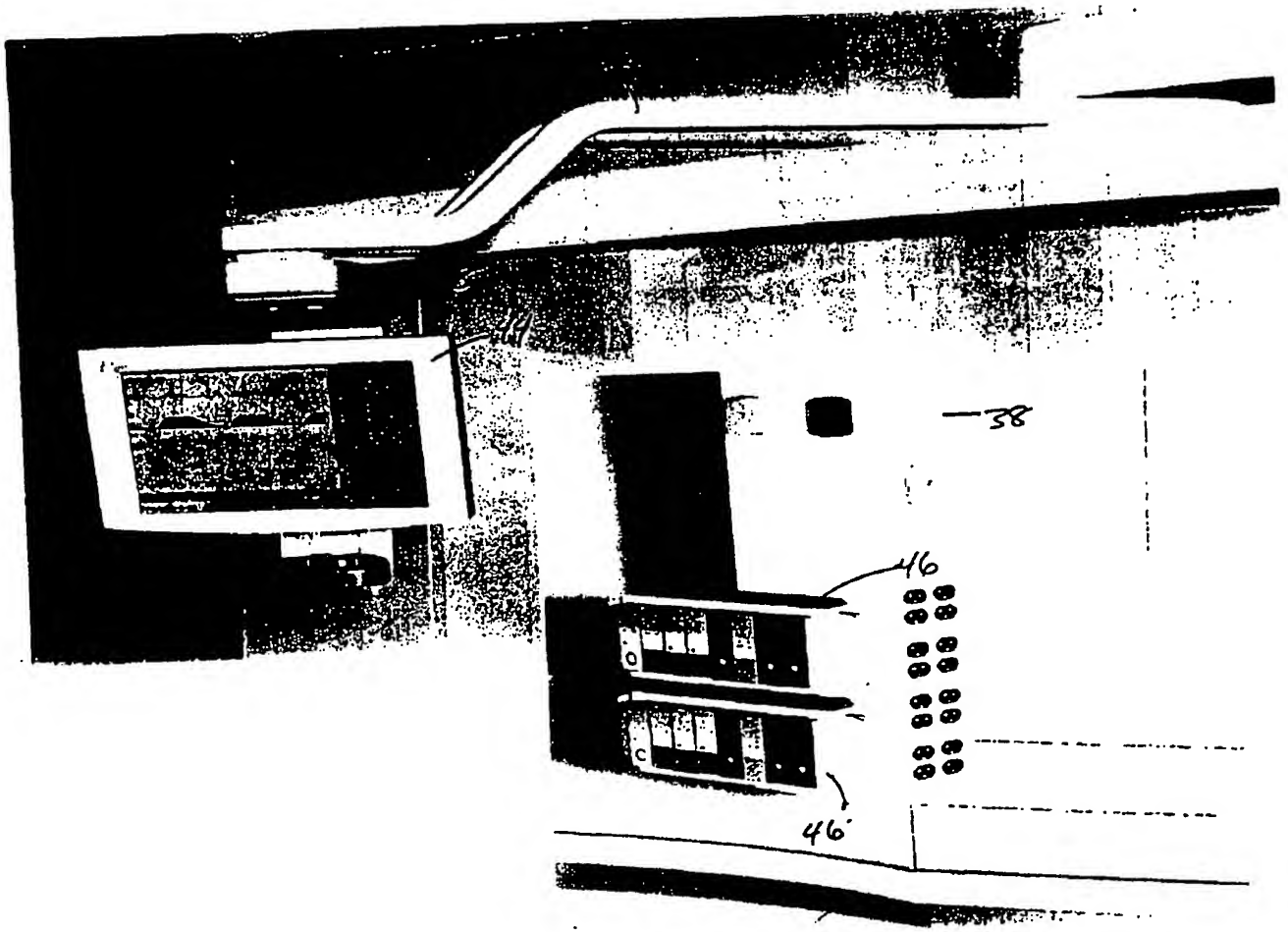


Fig. 19



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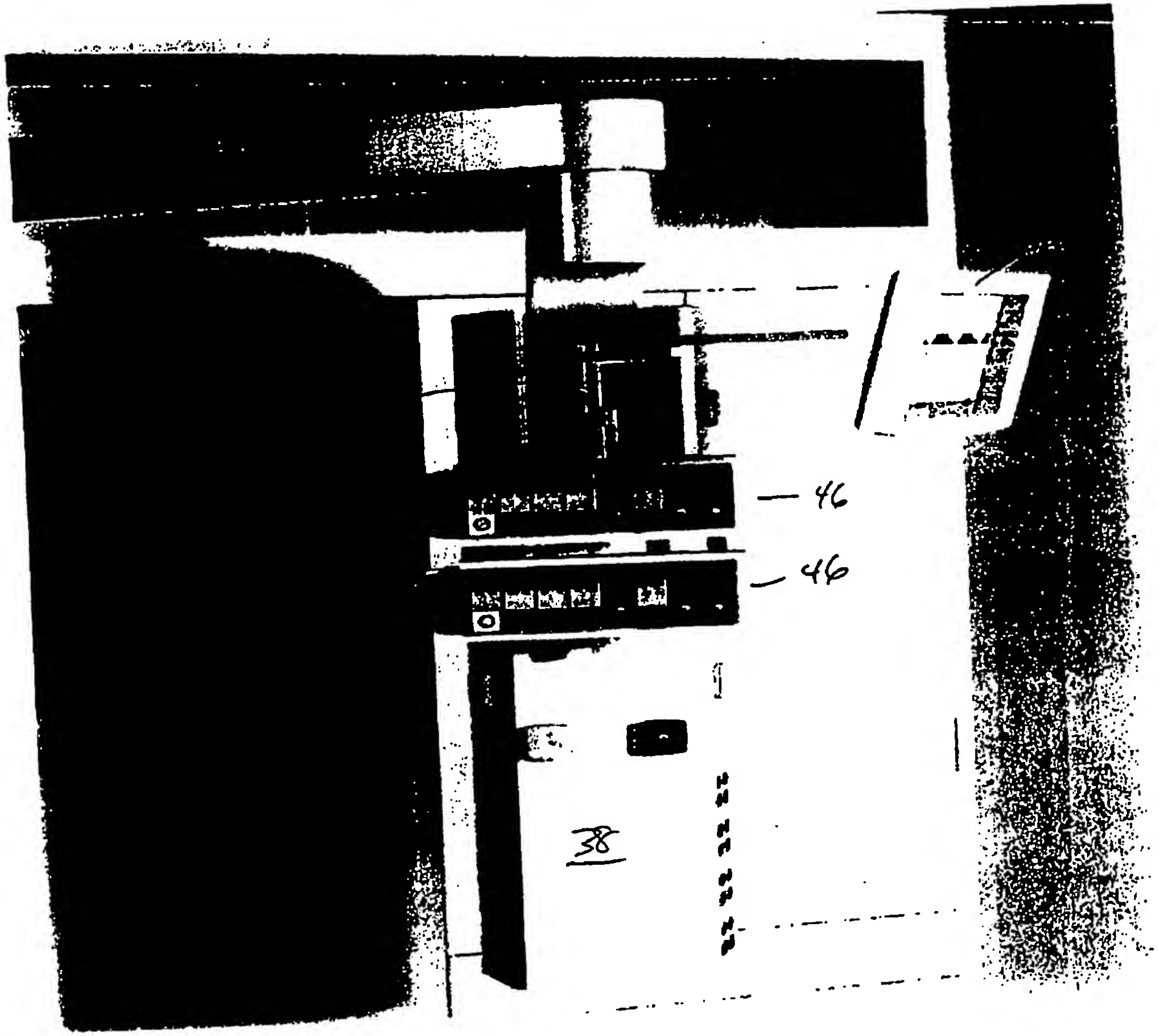

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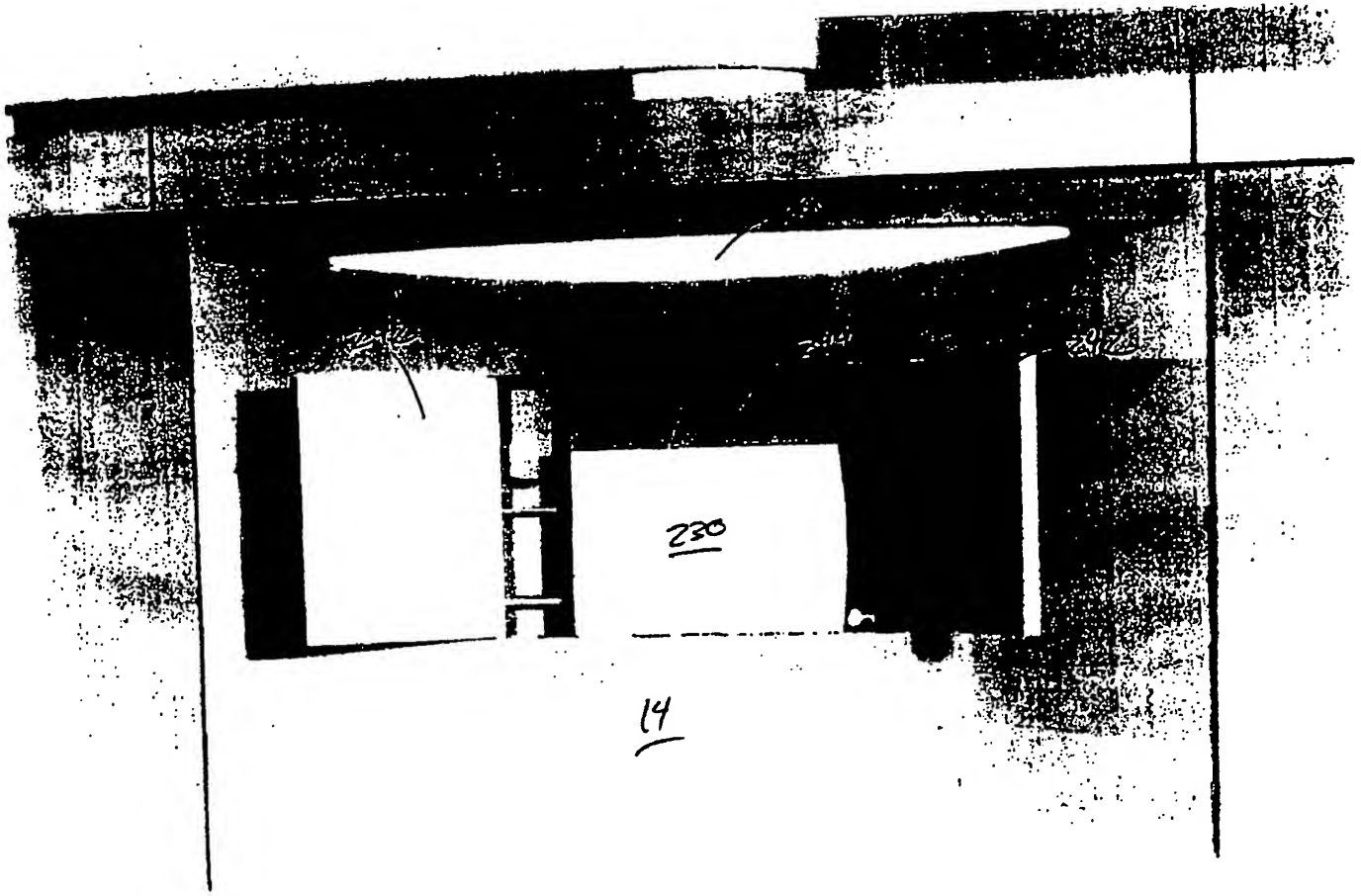

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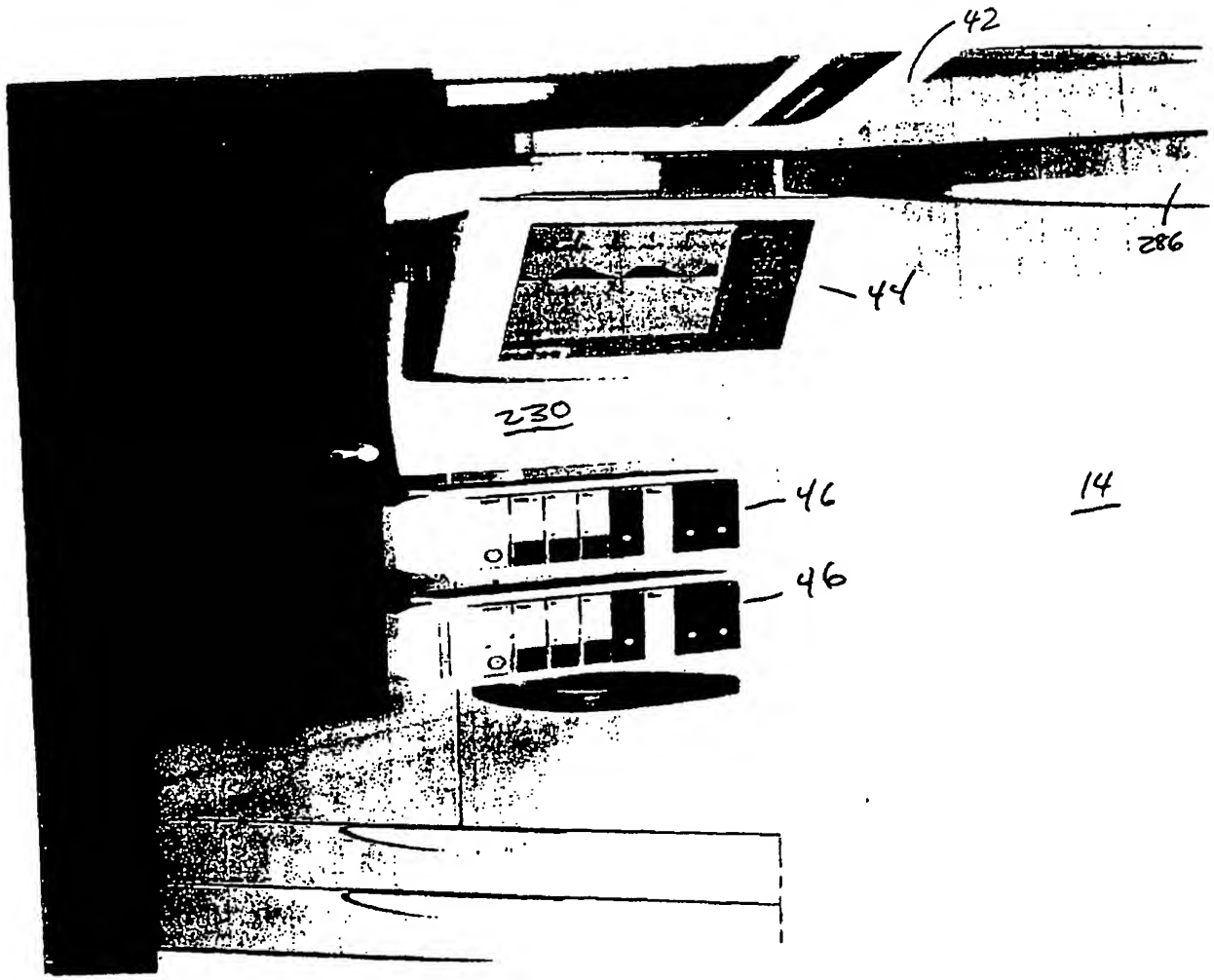


Fig. 23

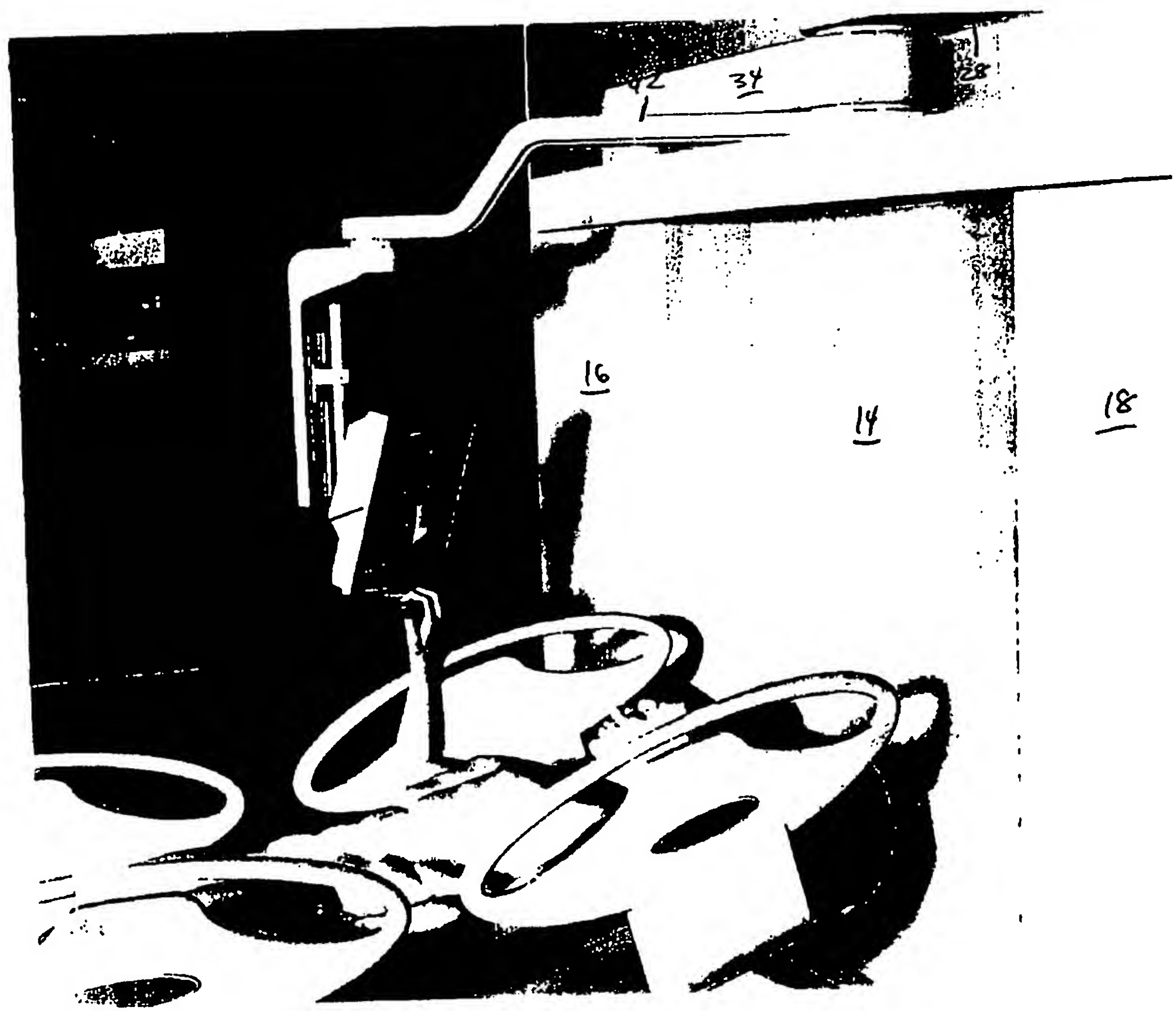


Fig. 24

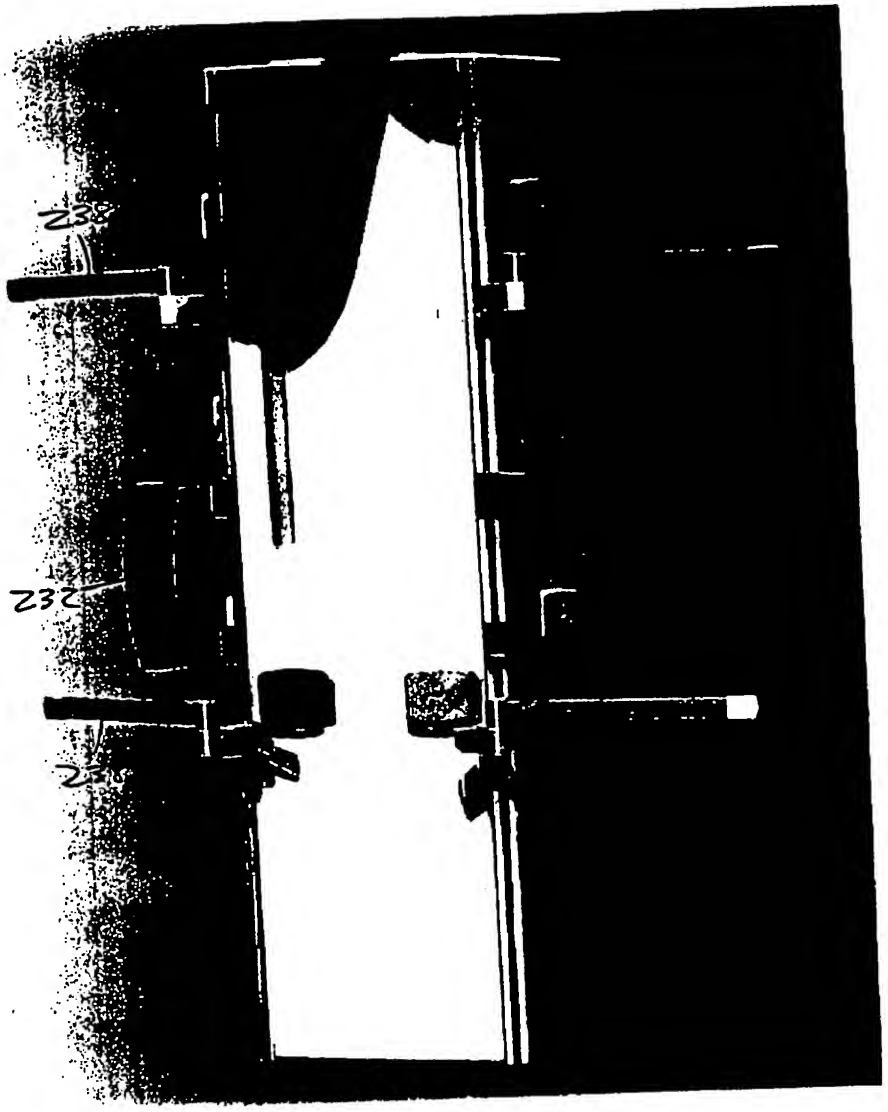


Fig. 25

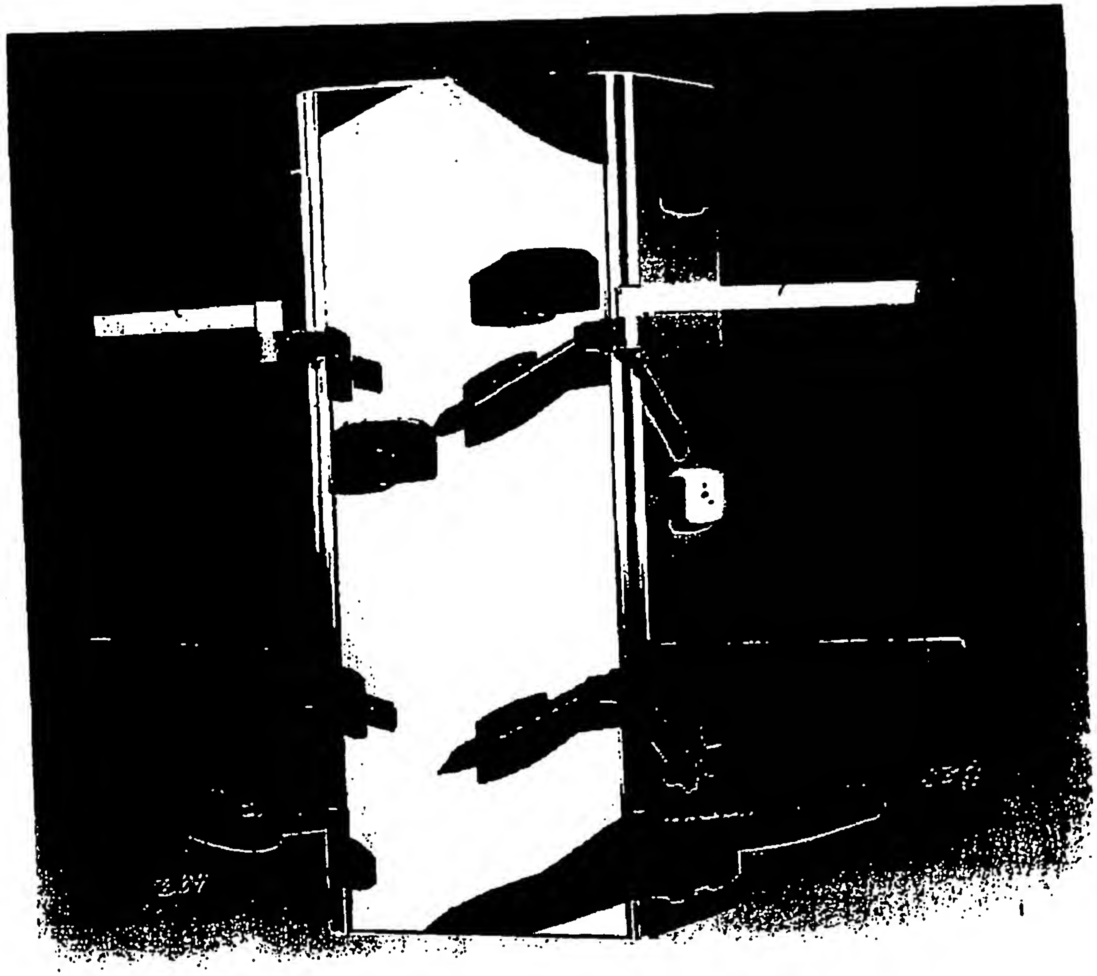


Fig. 26

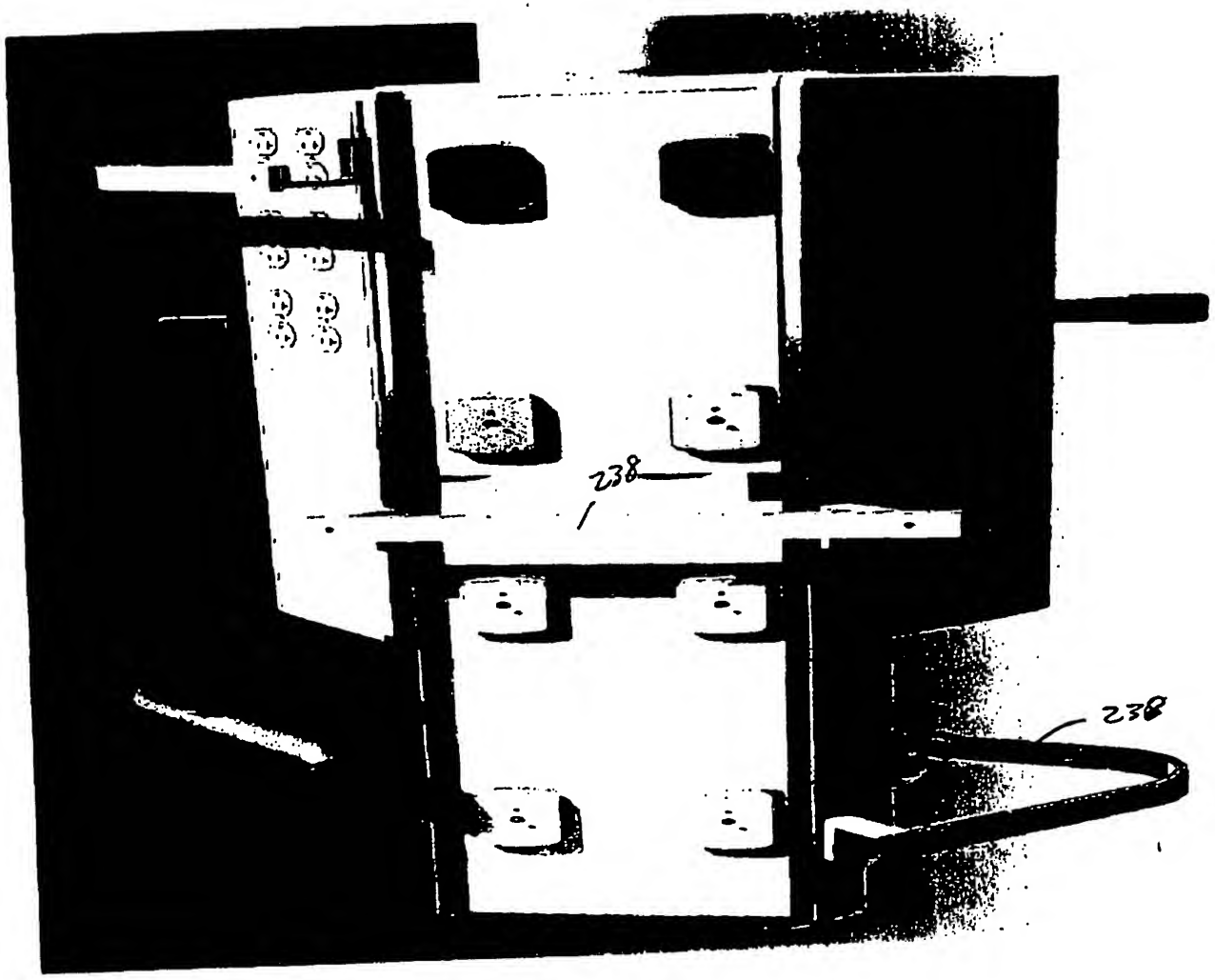


Fig. 27

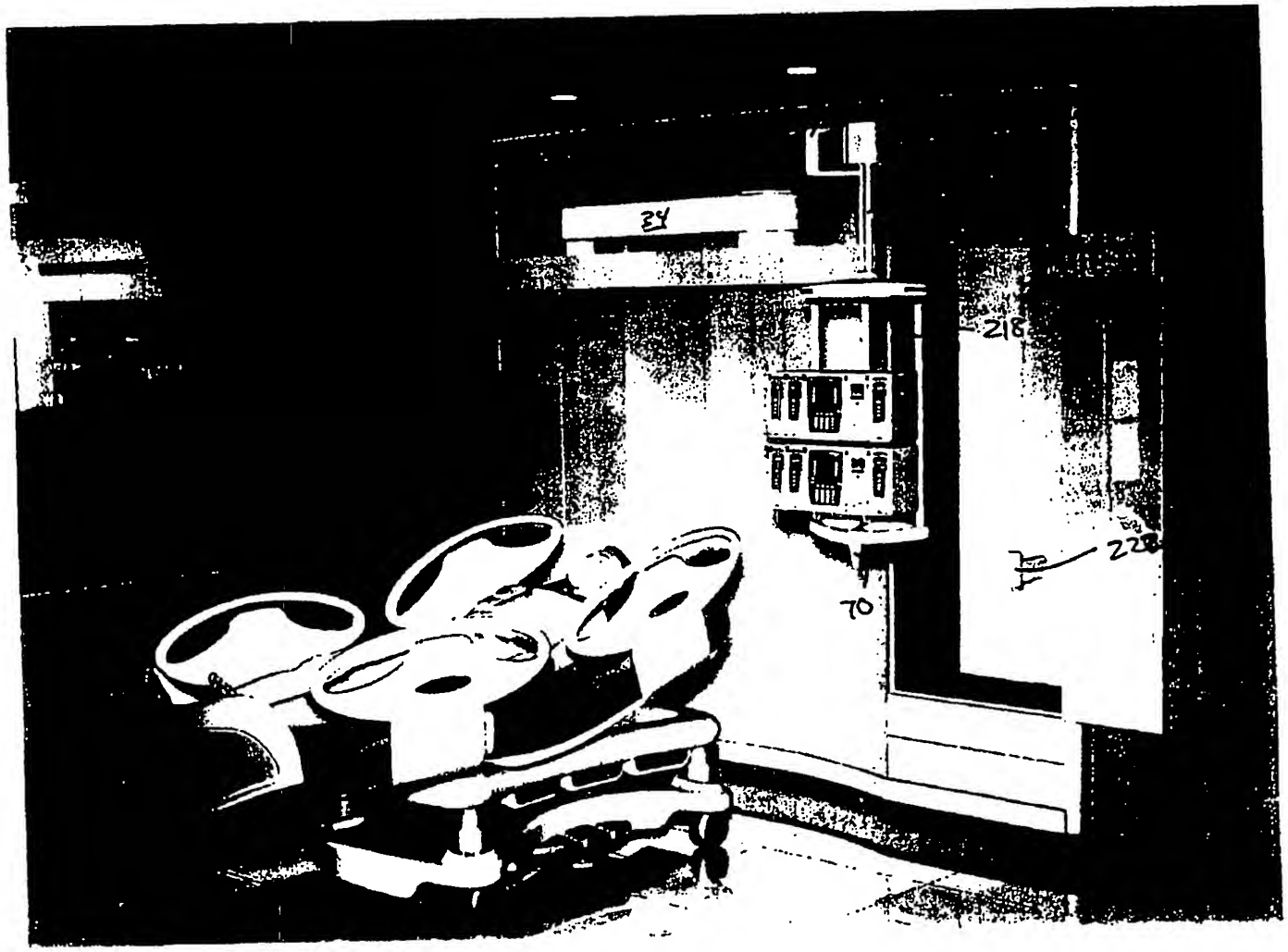


Fig. 28

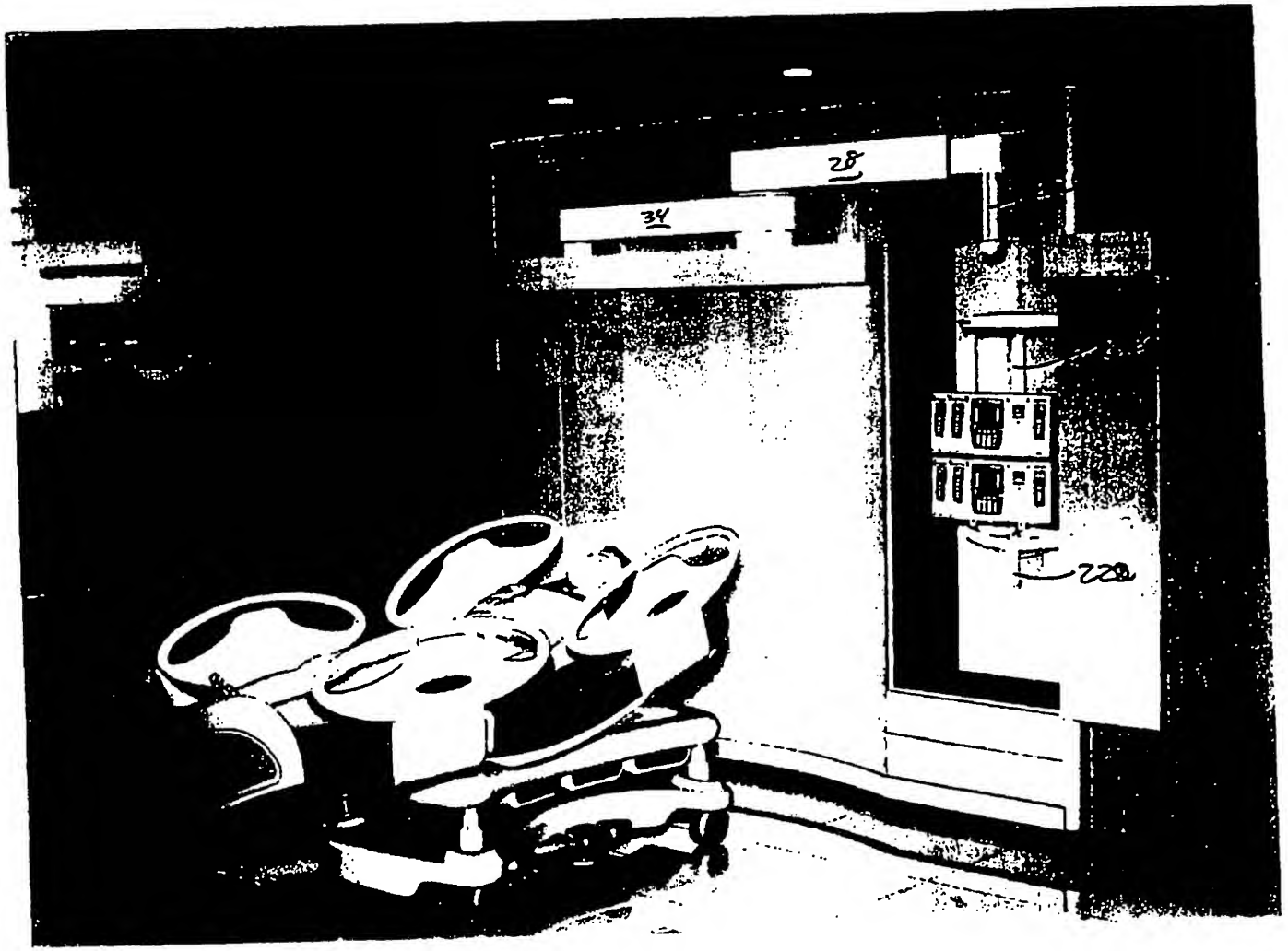


Fig. 29

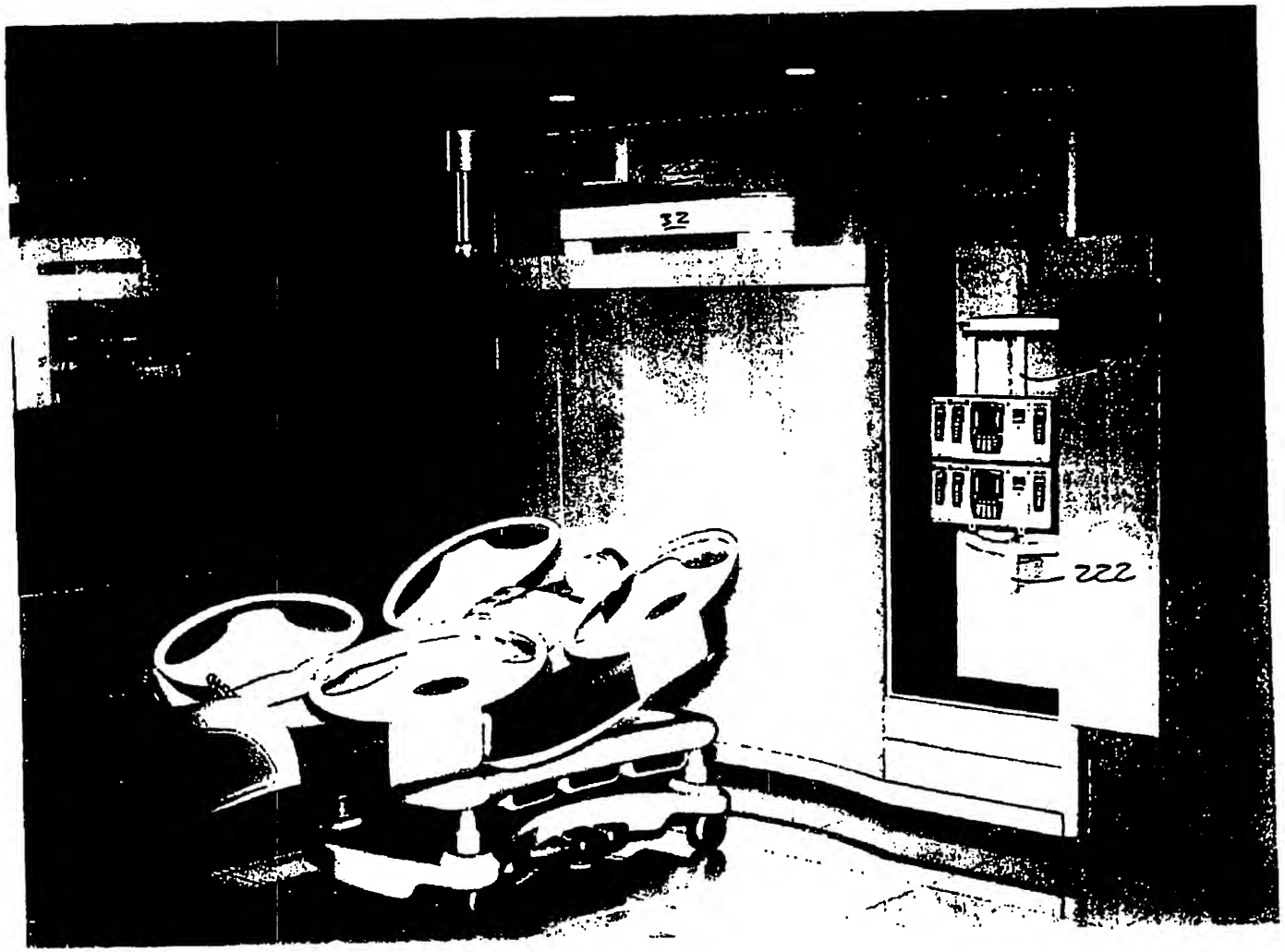


Fig. 30

Fig. 3

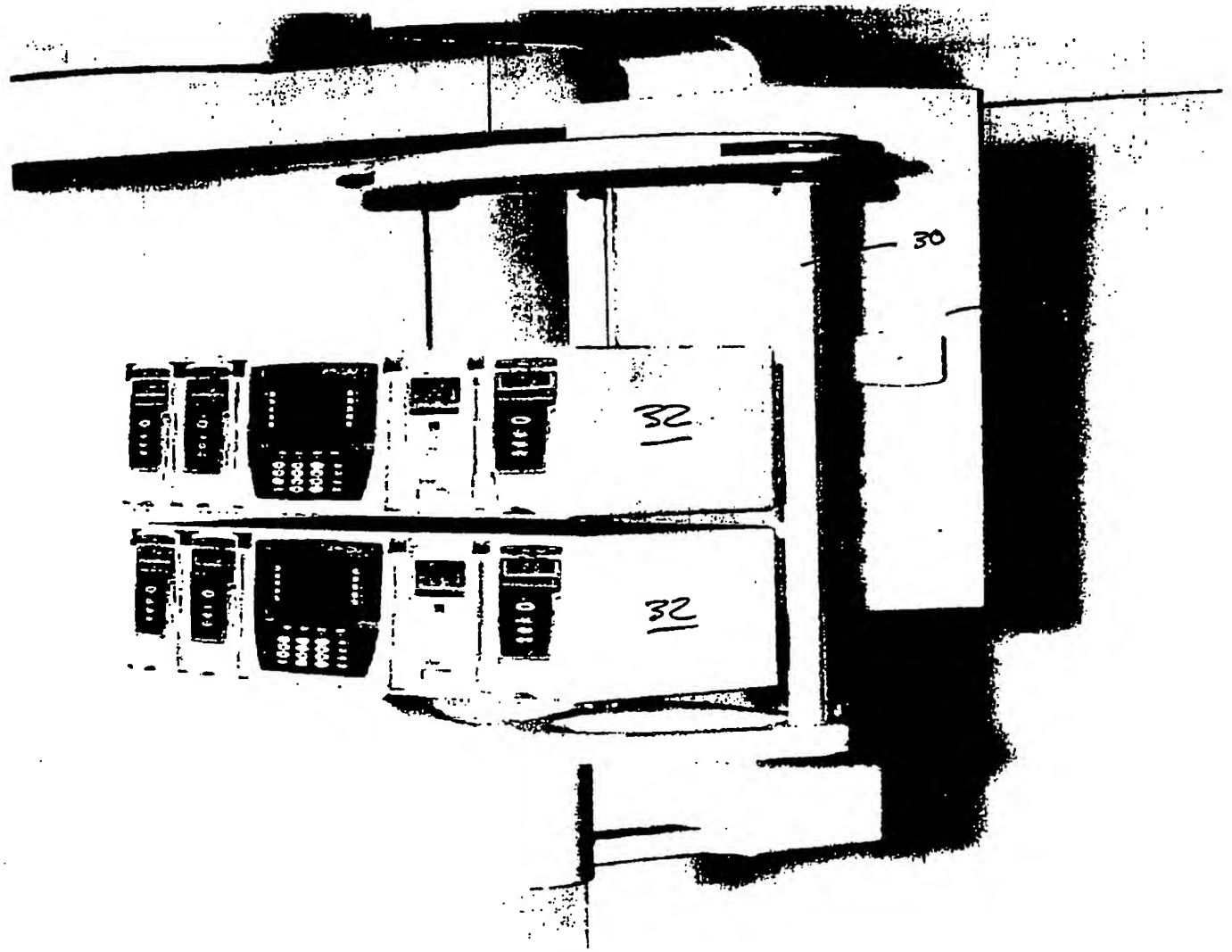


Fig. 32

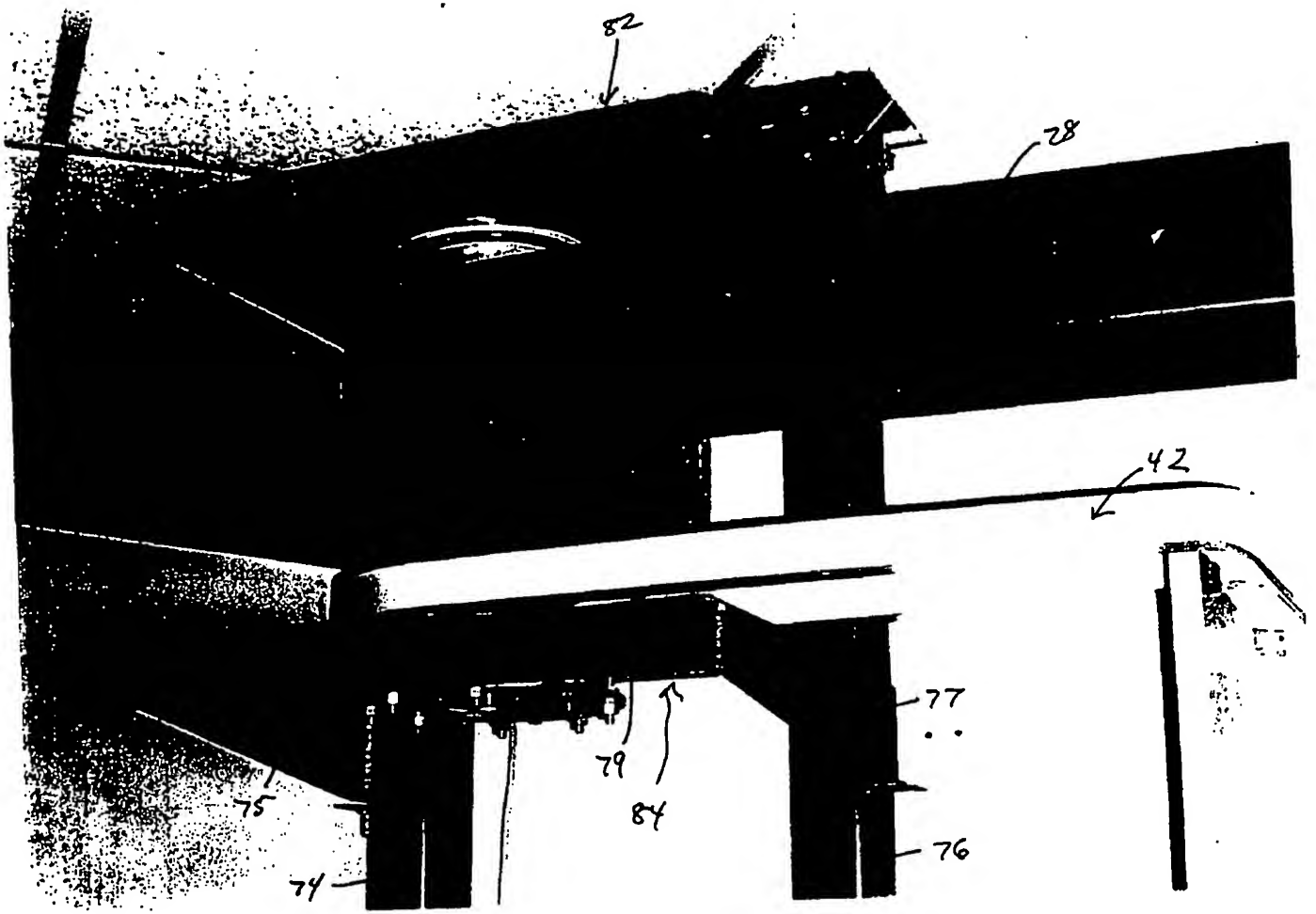


Fig. 33

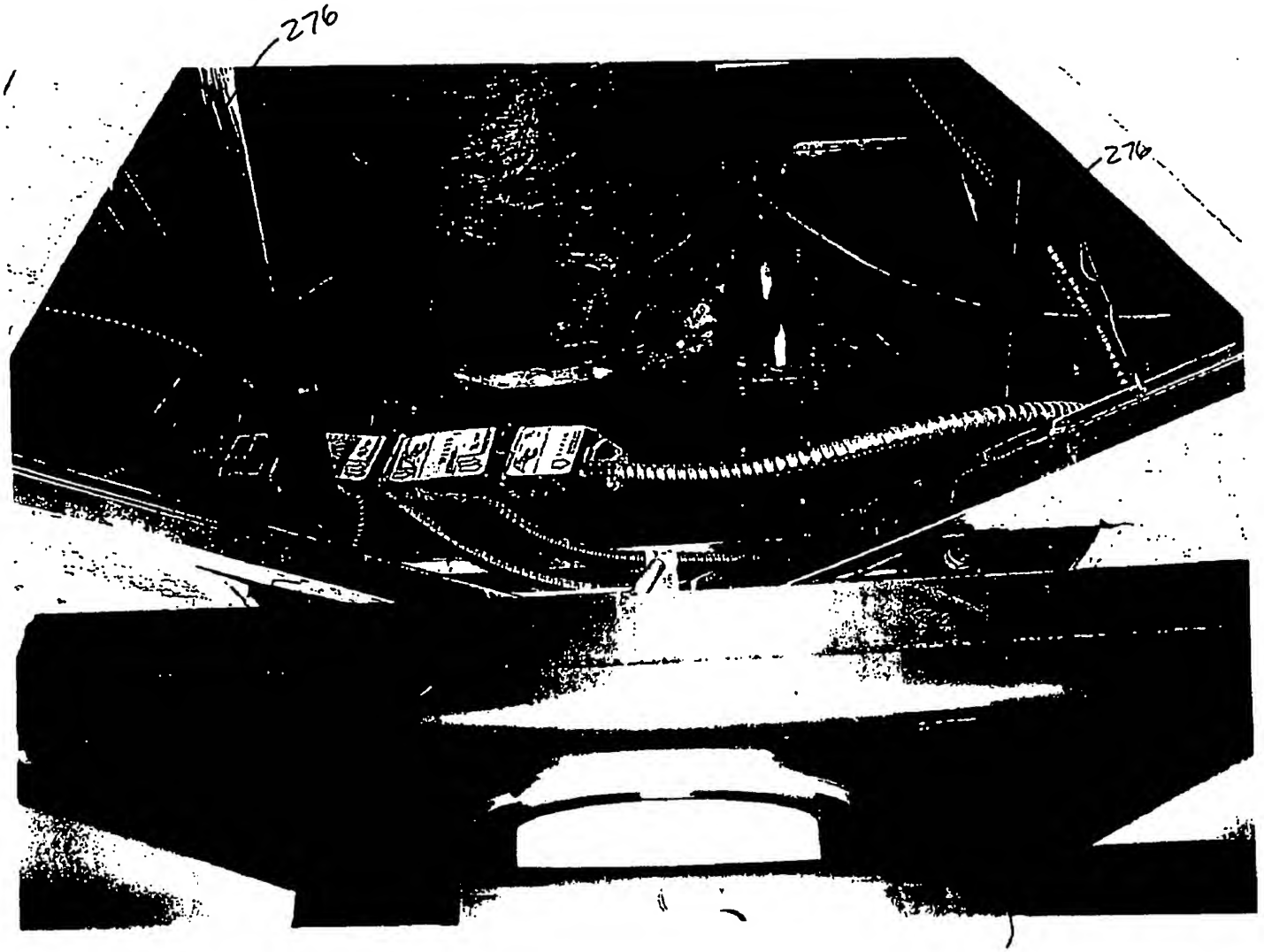
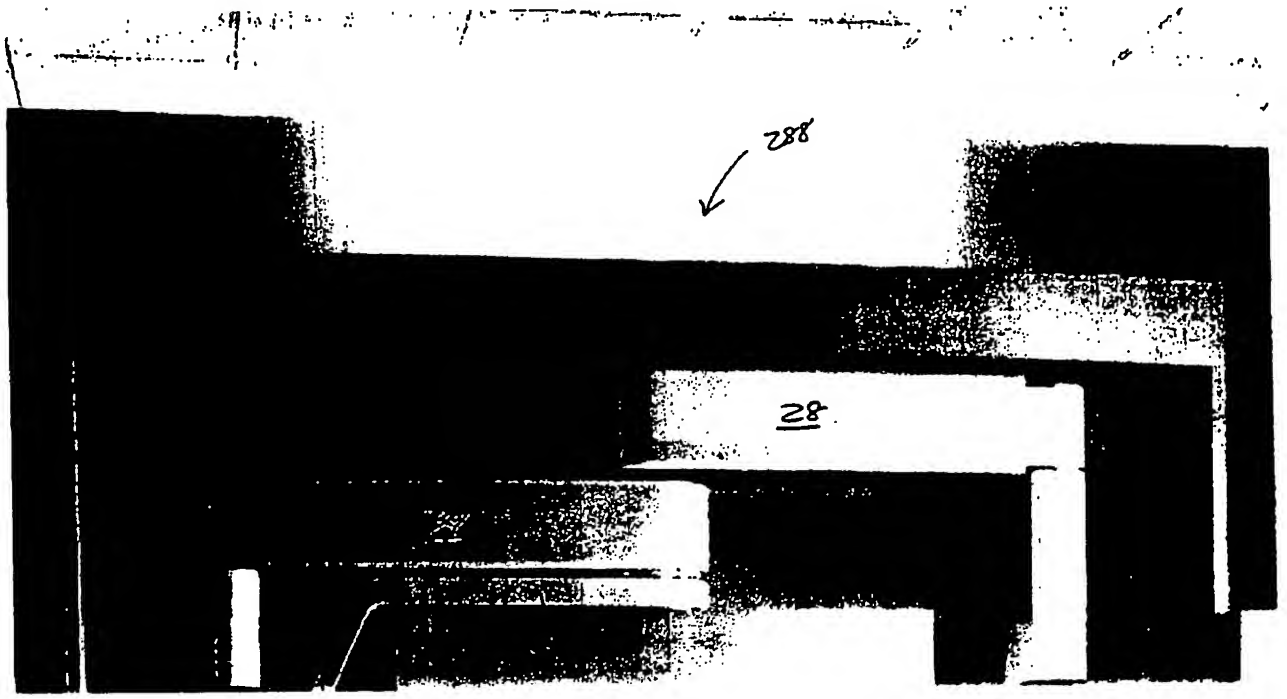


Fig. 34



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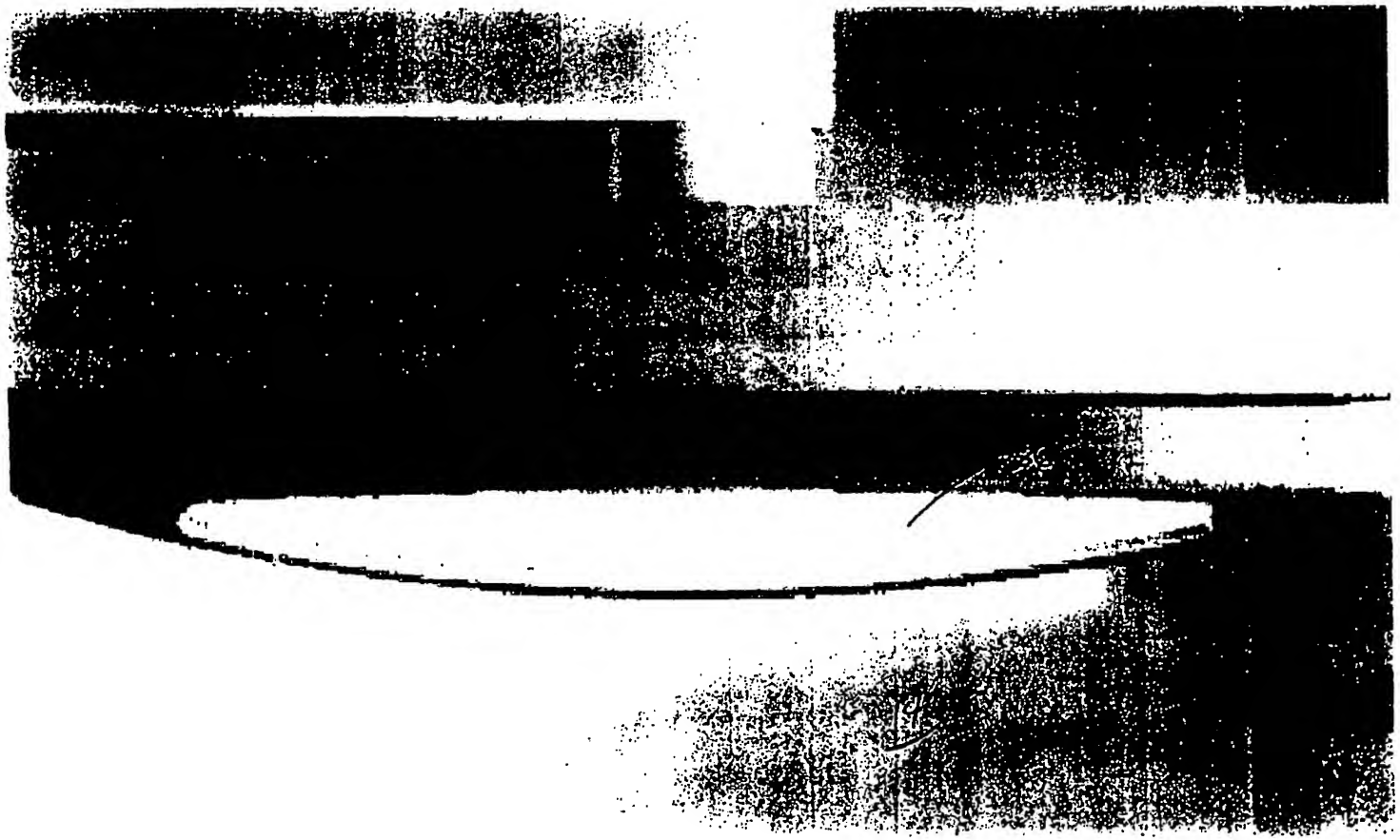


Fig. 36

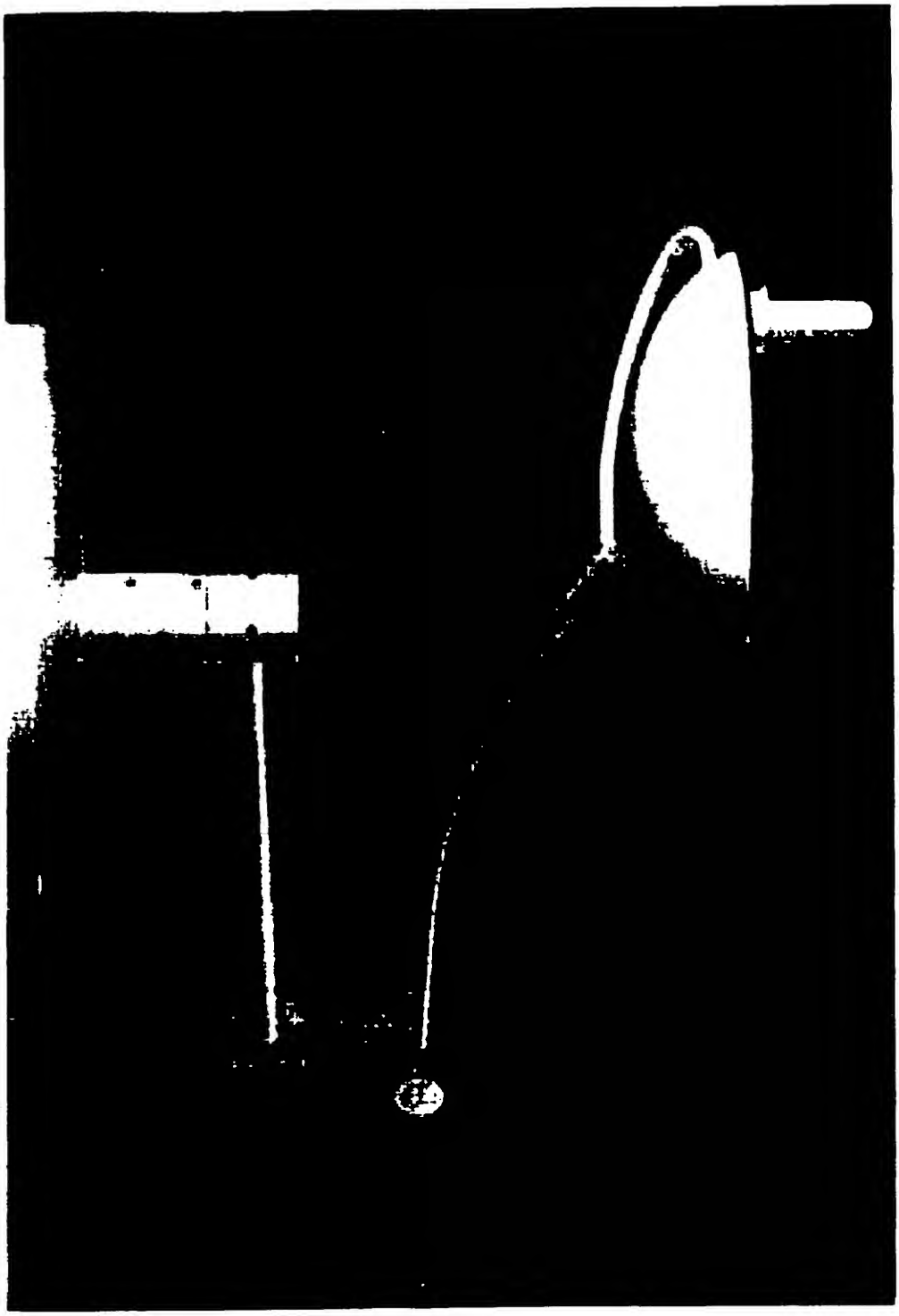
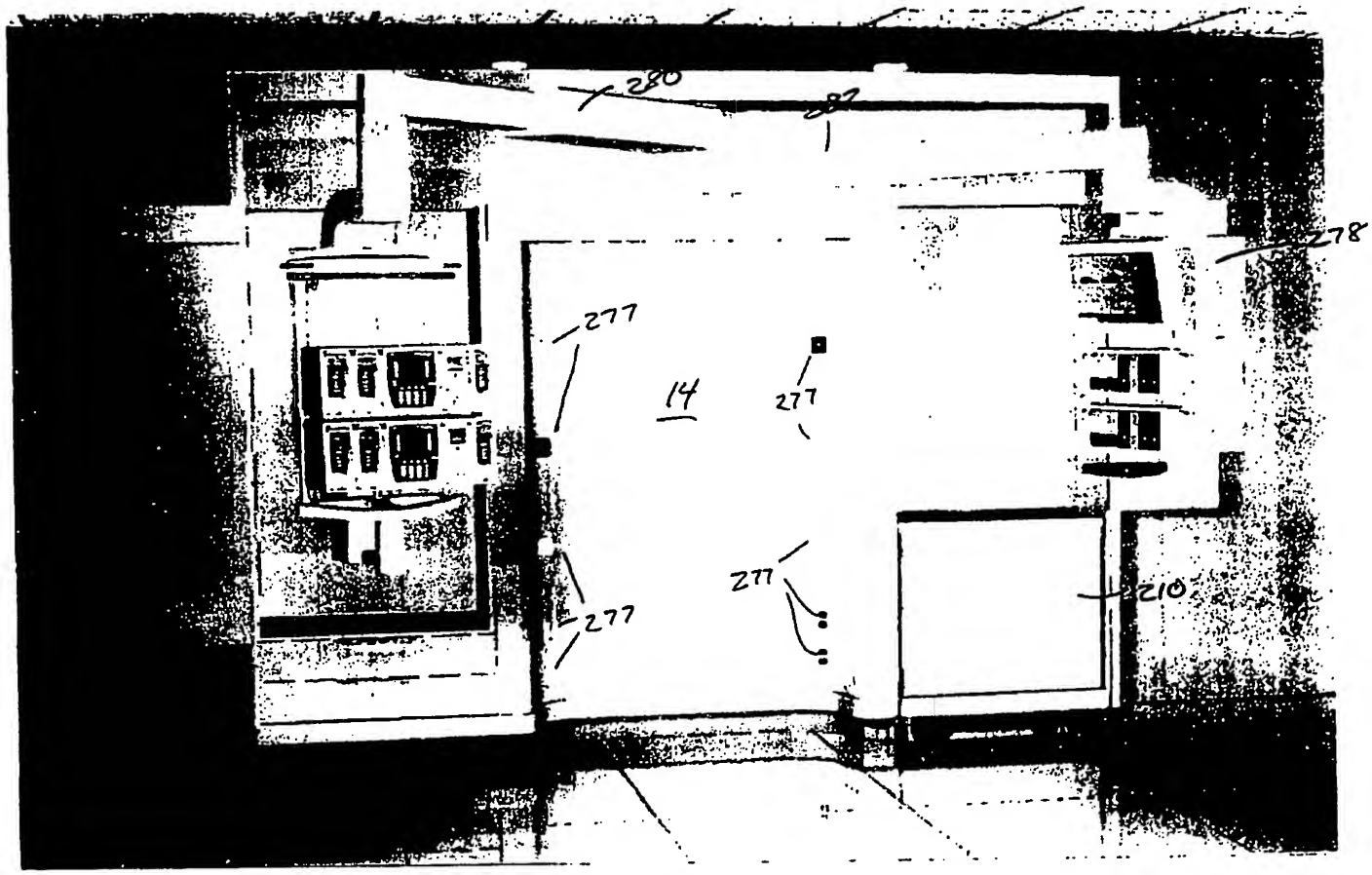


Fig. 37

Fig. 3B



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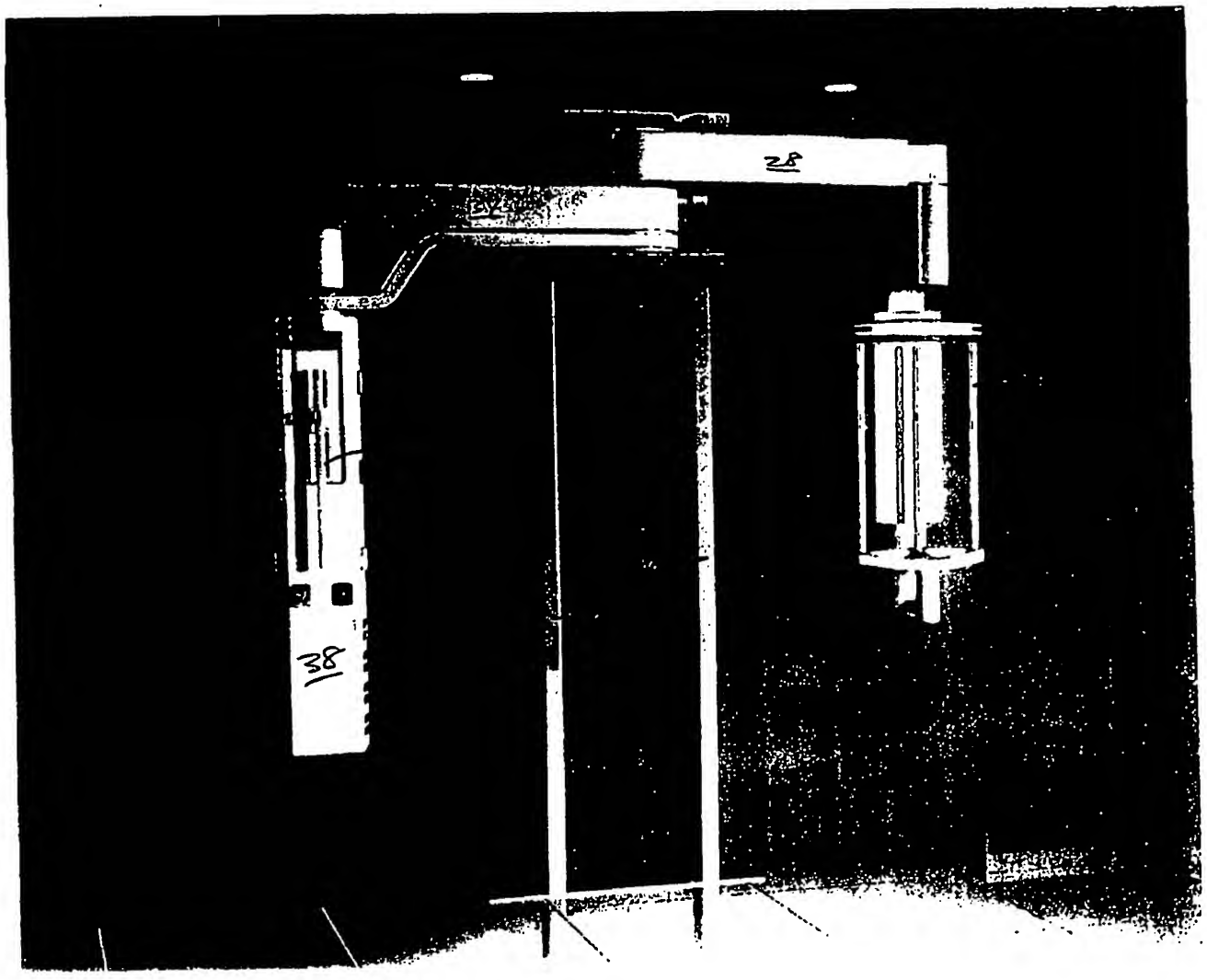

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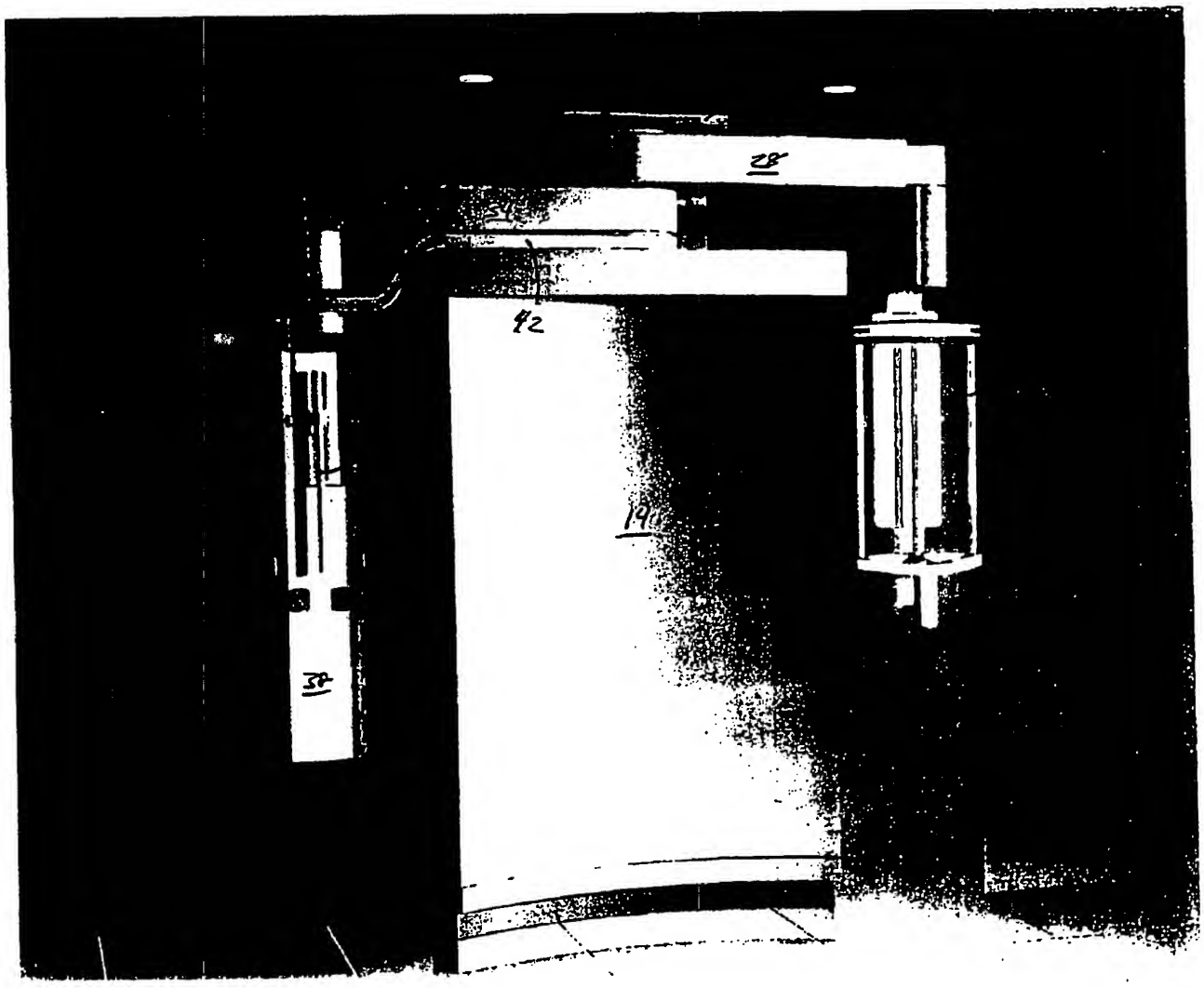

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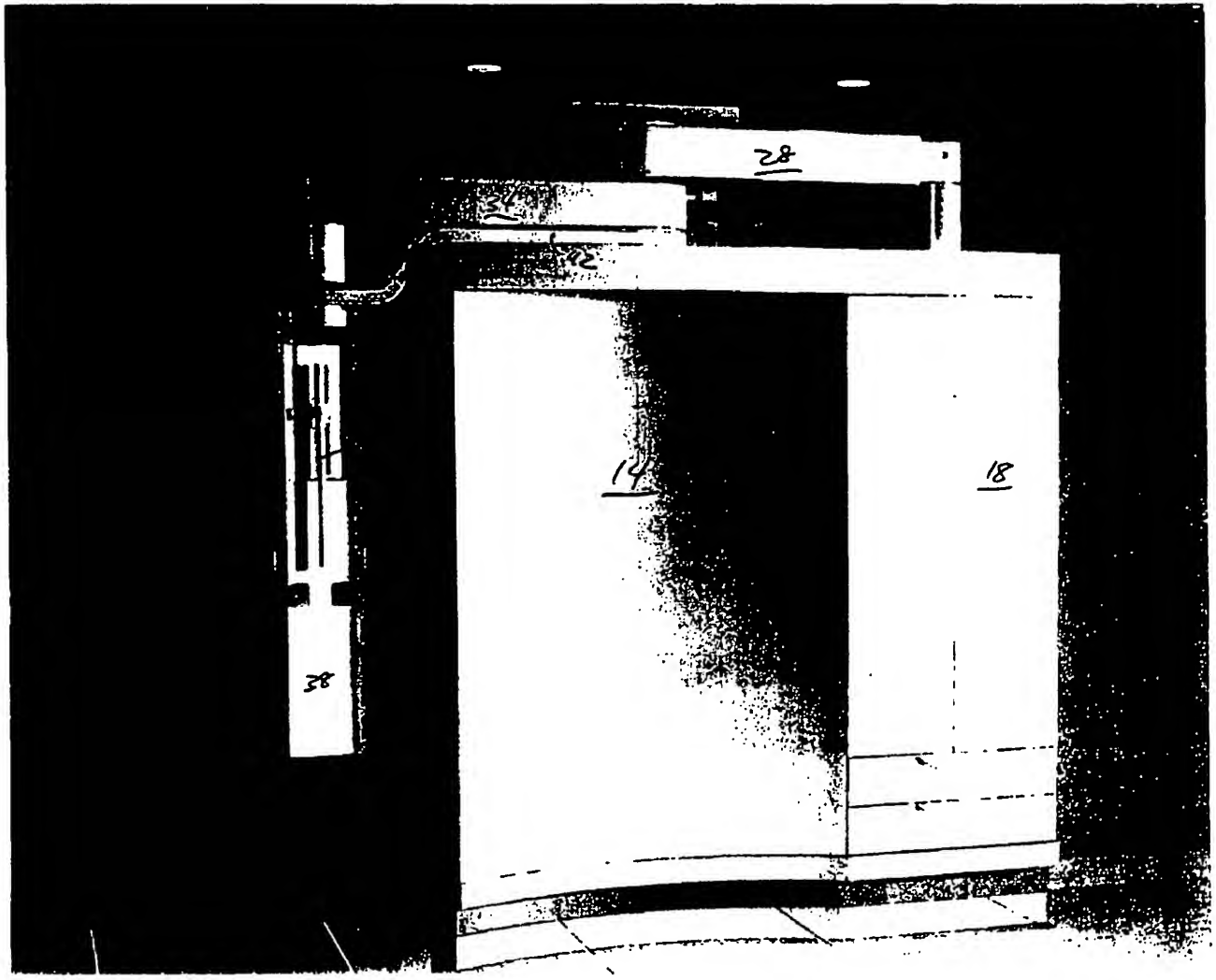

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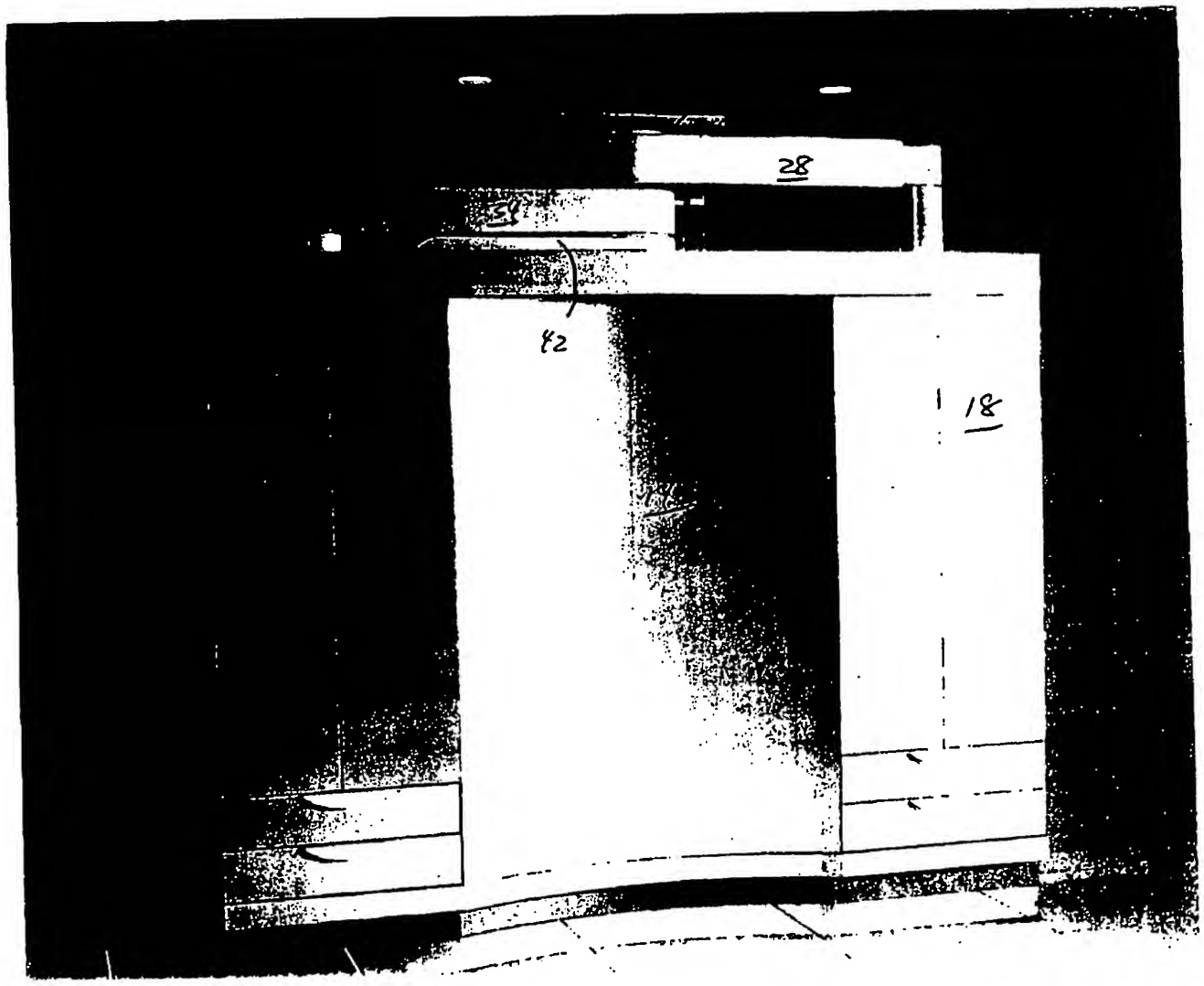
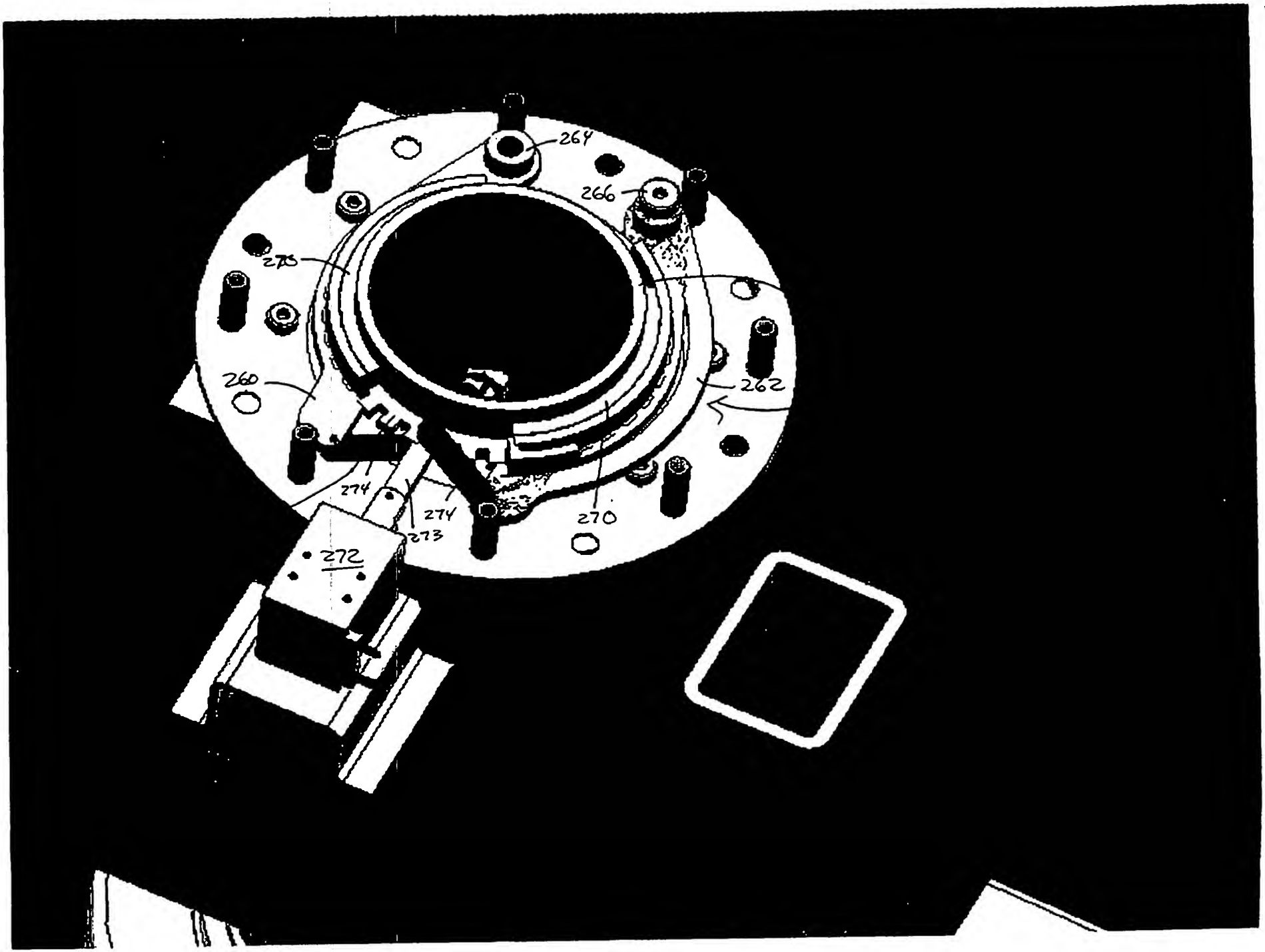


Fig. 43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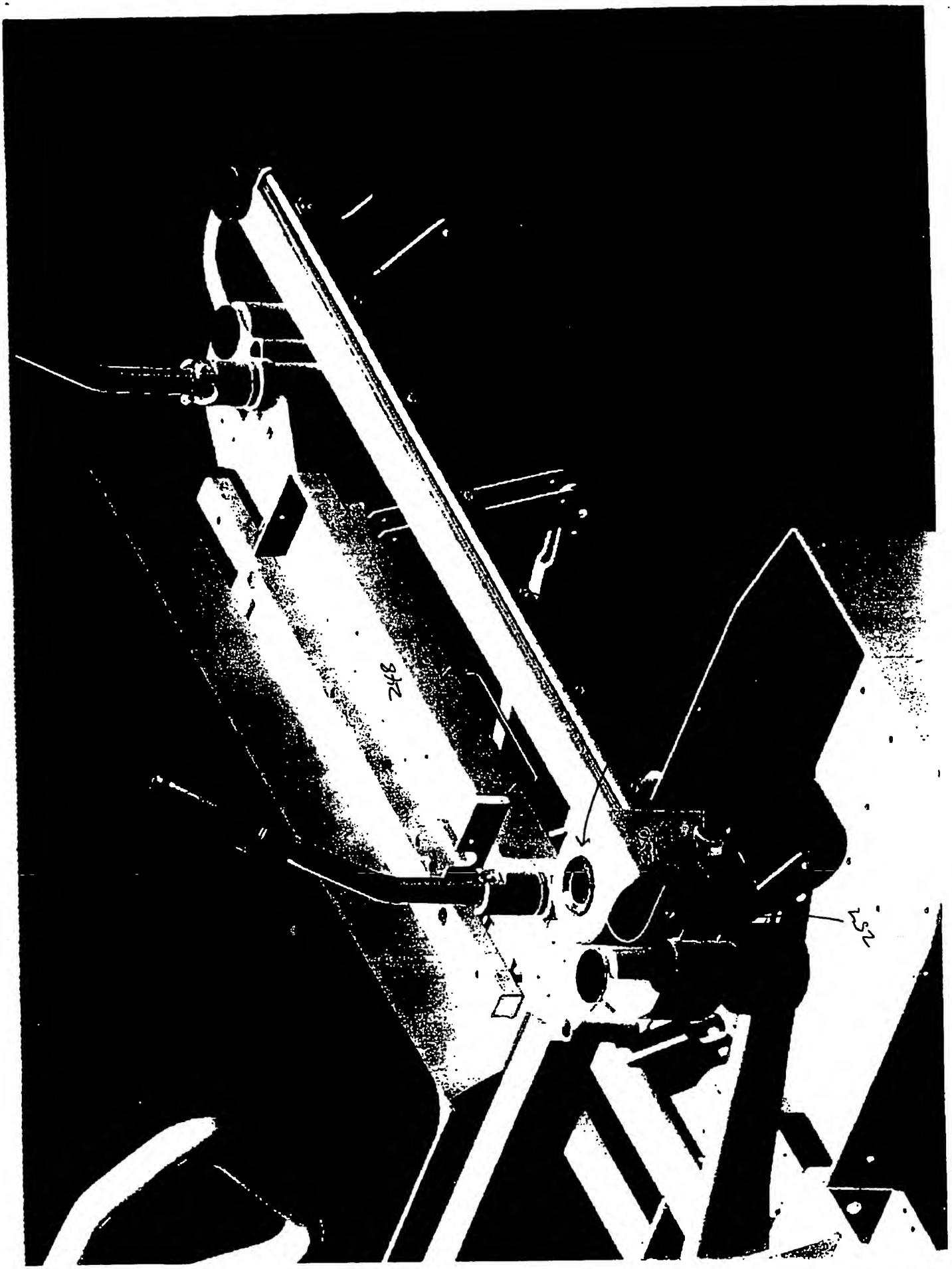
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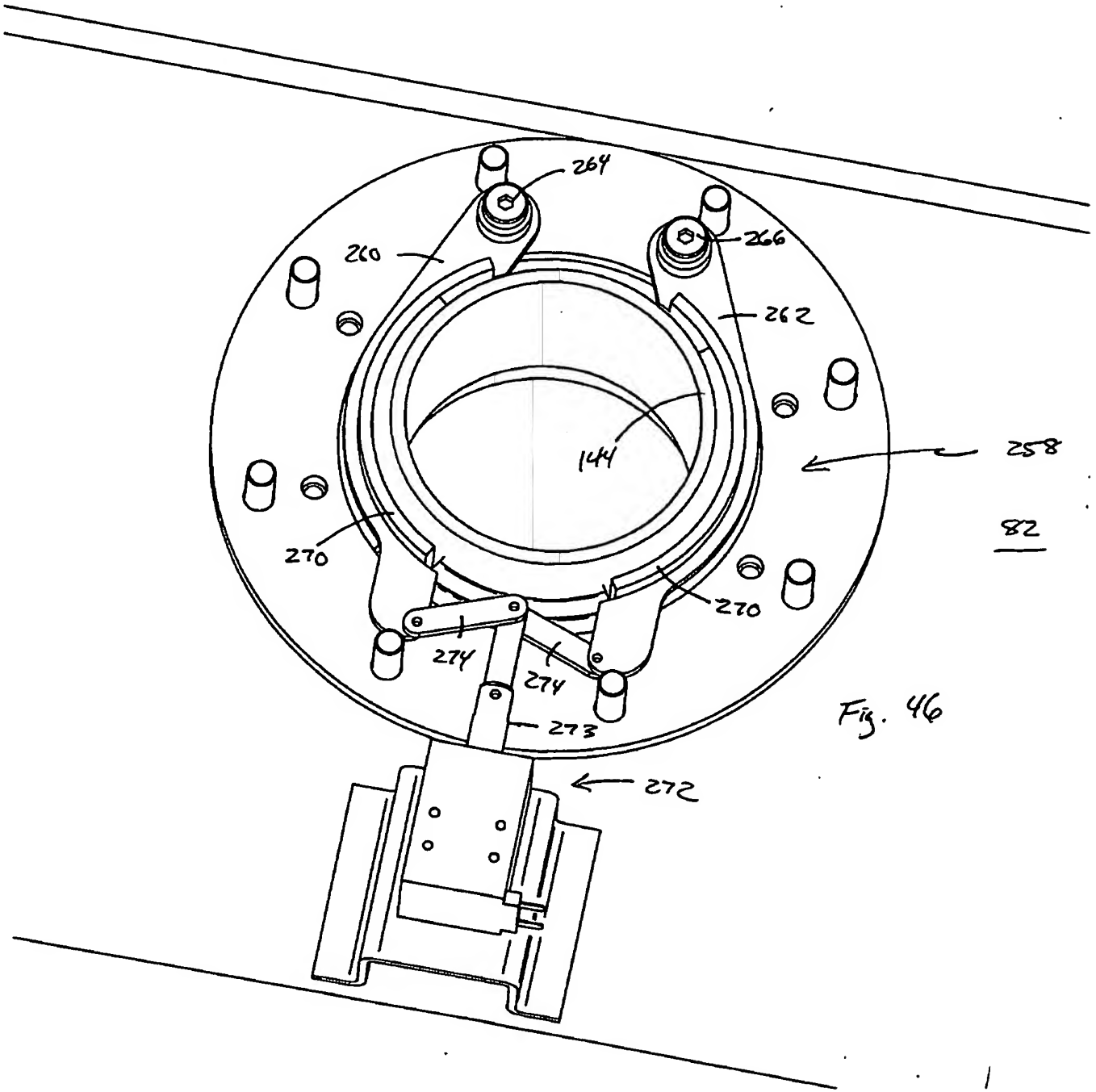


Fig. 46

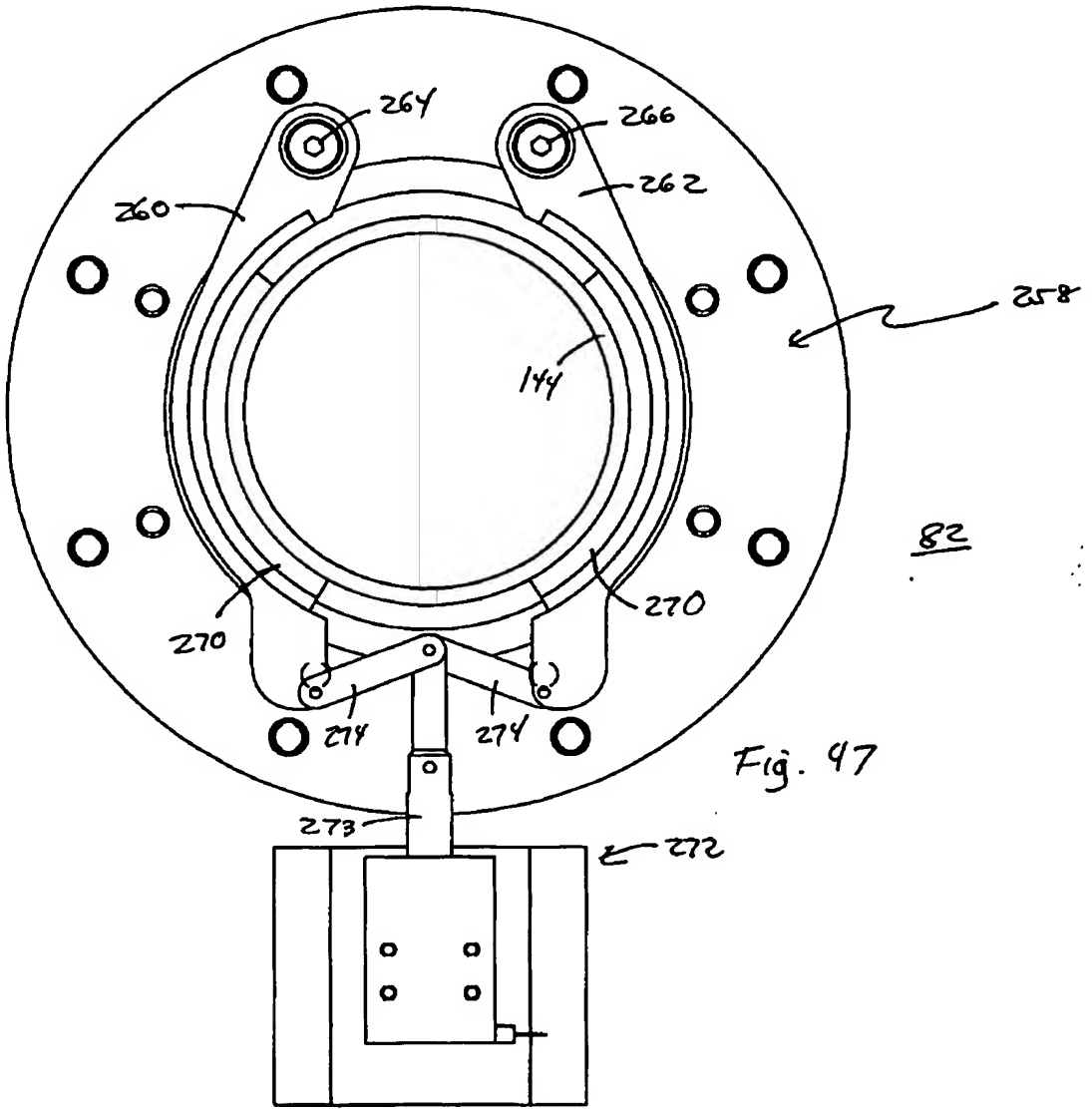


Fig. 47

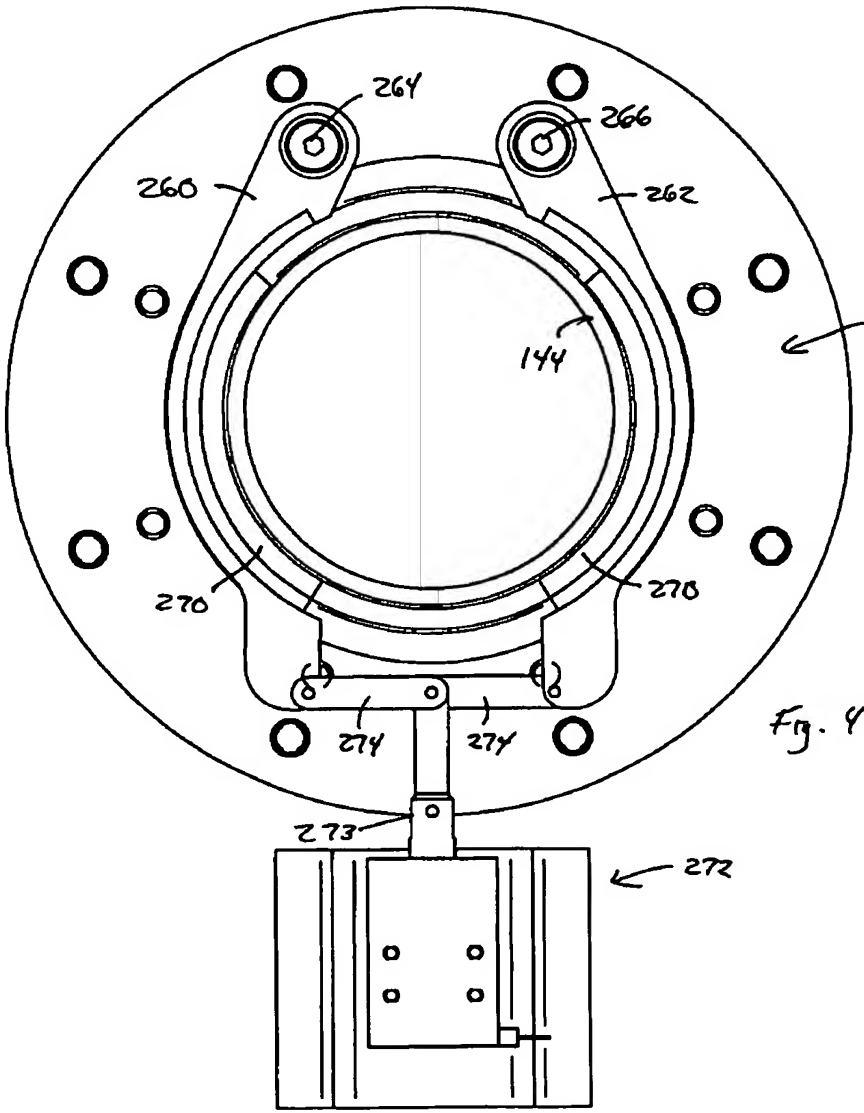


Fig. 48

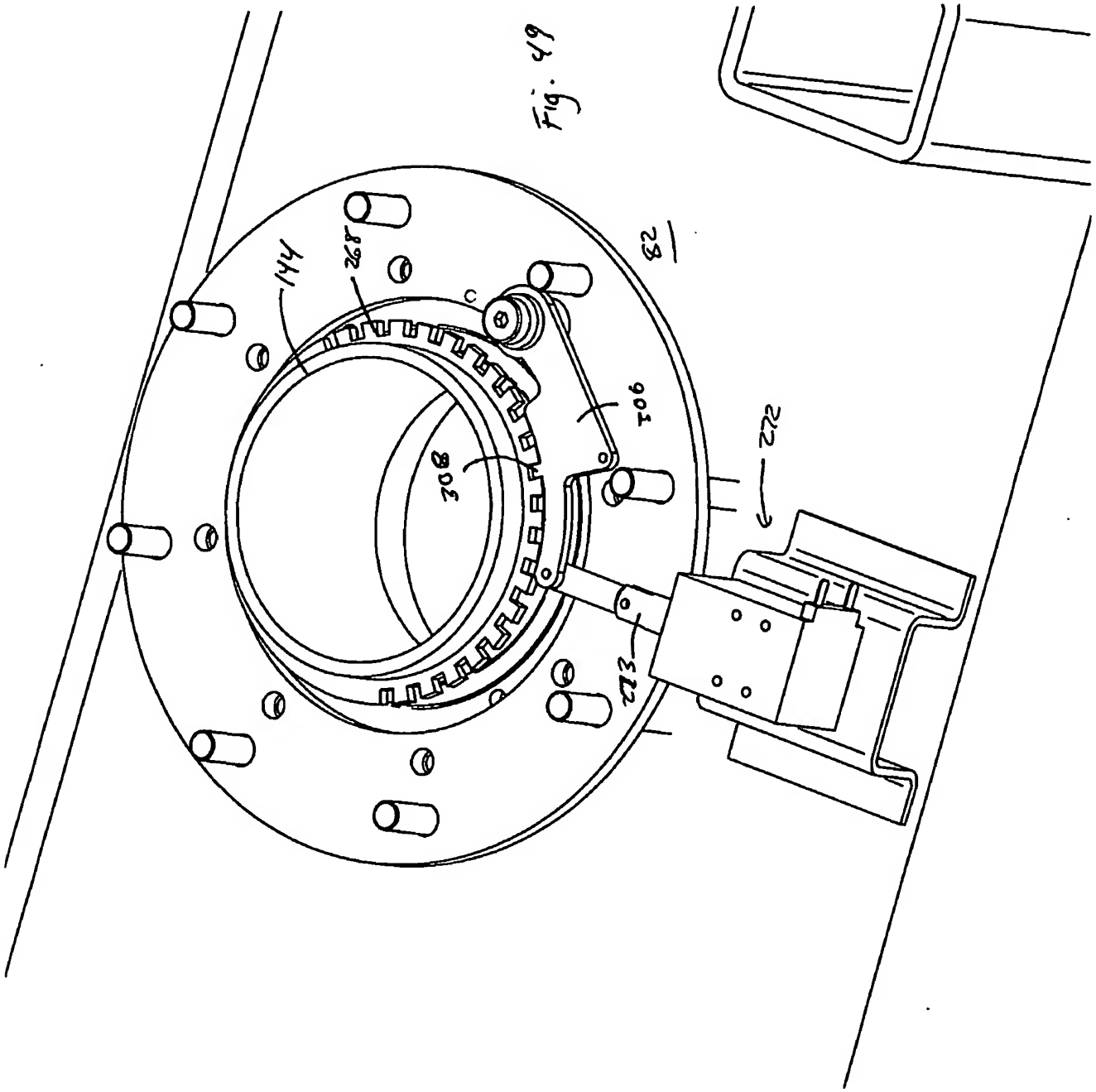


Fig. 49

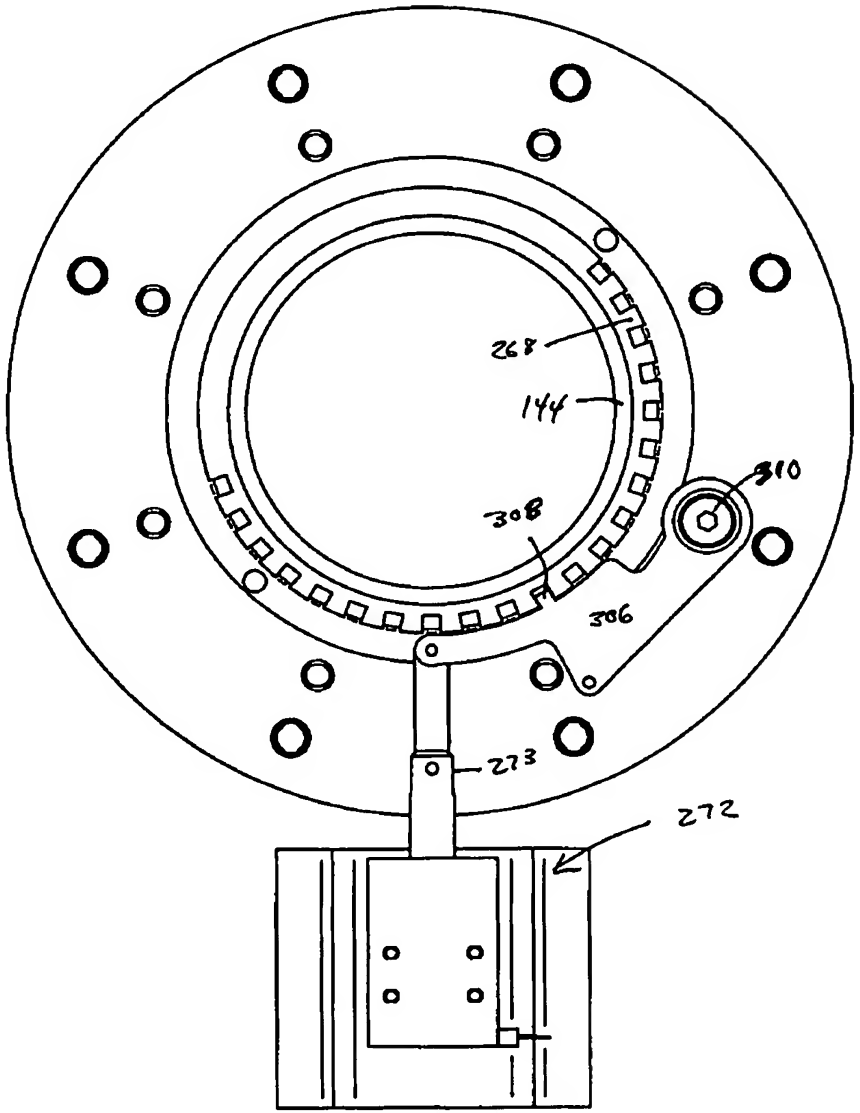
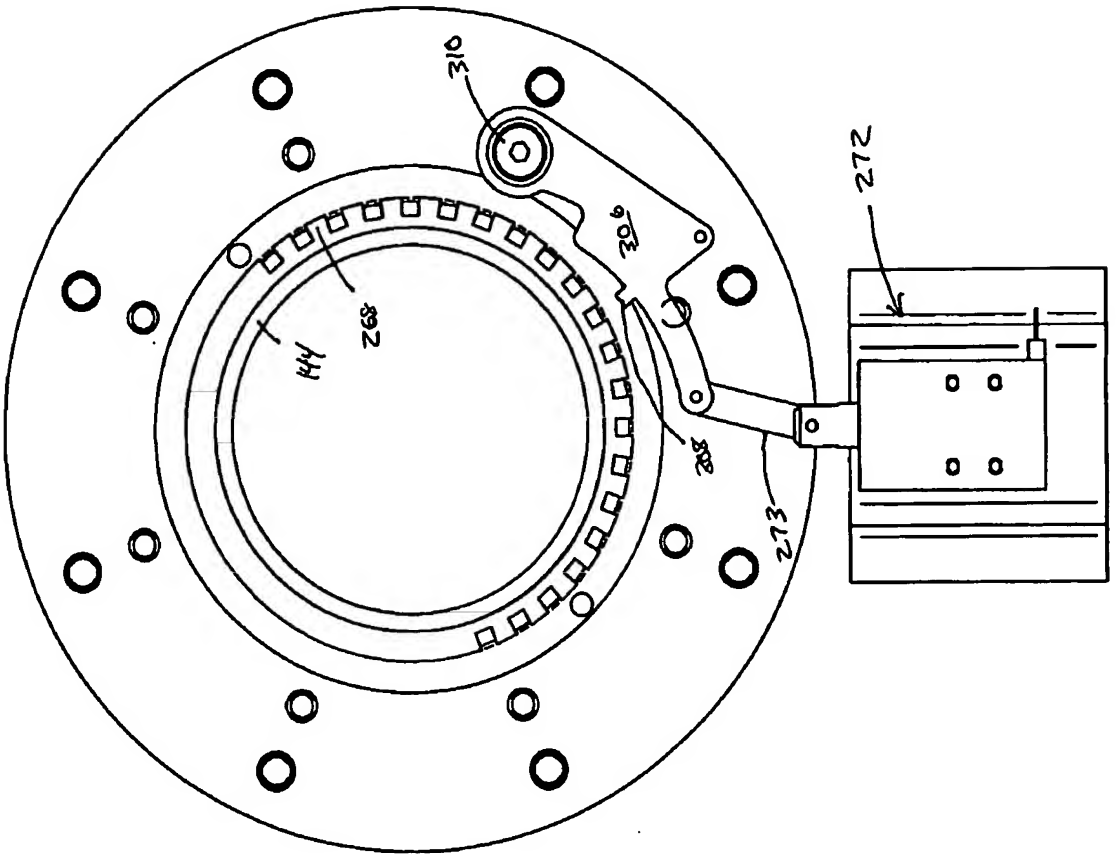


Fig. 5D

Fig. 51



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Problems Overcome/Key benefits

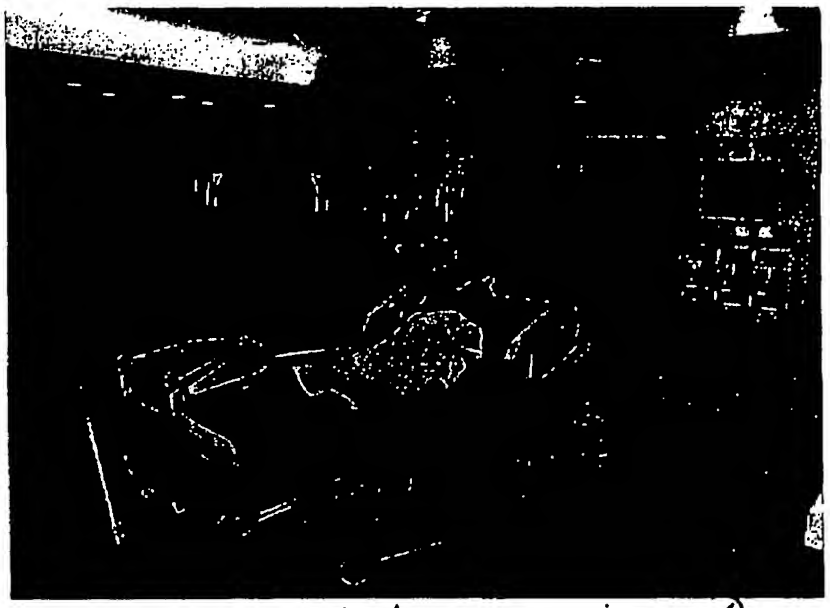
- ***Ability of room/equipment to flex up and down with the acuity of the patient.***
- ***Provides positioning flexibility of equipment/gases with the ability to store unused portions behind hidden panels/doors.***
- ***Hi/low feature in the IV equipment head allows for better ergonomic positioning of IV pumps/bags***
  lower to load IV Pump short/tall caregivers
- ***Hi/low feature of the IV equipment head also allows for docking and attachment of IV management system to the bed.***
- ***IV management stays off the floor during out of room transports.***
- ***Telescoping arm and IV equipment head can be adapted for use in OR and diagnostics for seemless, off the floor transport of IV equipment.***
- ***A separate cart can be used in diagnostics, OR, or ICU if an telescoping arm system is not available.***
- ***Aesthetic appearance of the system is improved relative to a typical ceiling arm system.***

Hill-Rom

A HILL-ROM COMPANY

Problems Overcome/Key benefits

- *Patient does not look up at the ceiling and see an overhead arm structure.*
- *A third arm supports the patient monitor, CPU, and Satellite modules. Arm can be repositioned to either side of bed*
- *All arms can be flipped from one side of the cabinet to the other side of the cabinet for storage allowing for flexible equipment placement.*
- *Drawers are provided for bed side storage of supplies and sundries.*
- *Gas outlet placement improves the ergonomics of using and attaching flowmeters, manometers, etc.*
- *Electrical Outlet placement improves the ergonomics of using corded equipment.*
- *Center cabinet serves as a bed locator that does not contain obstructions that could interfere with bed movement.*
- *Center cabinet prevents placement or attachment of equipment that may interfere with bed movement.*
- *Center cabinet is concave to create more clearance at foot end of bed.*



Consulted caregivers, repositioned ↑ (primary service head)

Equipment rack

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